



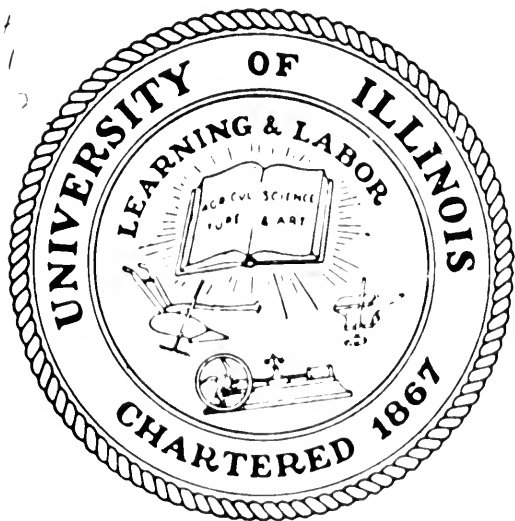
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# STUDIES IN THE LINGUISTIC SCIENCES

VOLUME 4, NUMBER 1 SPRING, 1974

DEPARTMENT OF LINGUISTICS, UNIVERSITY OF ILLINOIS  
URBANA, ILLINOIS 61801

# STUDIES IN THE LINGUISTIC SCIENCES

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# TABLE OF CONTENTS

Yiwola Awoyale: Yoruba Gerundive Structures and the Notion of 'Target Structures'.....	1
John R. Houston, Jr.: Dari Relative Clauses.....	32
David E. Johnson: Adjective Flipping and the Notion of Target Structure.....	59
Michael Kenstowicz: Inflectional Accent of the Serbo-Croatian Noun.....	80
Charles W. Kisseberth and Mohammad Imam Abasheikh: A Case of Systematic Avoidance of Homonyms.....	107
Richard J. Leskosky: Not Your Usual Use of <u>You</u> .....	125
Lise Menn: Assertions Not Made by the Main Clause of a Sentence.....	132
Margie O'Bryan: The Role of Analogy in Non-Derived Formations in Zulu.....	144
Marc Rosenberg: Another <u>Pretend</u> Paper.....	179
Barbara Schwarte: Intuitions of Grammaticality and the "Law of Contrast": A Pilot Study.....	198



YORUBA GERUNDIVE STRUCTURES AND THE NOTION  
OF 'TARGET STRUCTURES'

Yiwola Awoyale

INTRODUCTION

The hypothesis of target structures is that each language has a relatively small set of "target structures" -- a set of constraints which apply at some relatively superficial level, as a sort of filter on derivations. The correctness of such an hypothesis may explain why in natural language diverse underlying structures are mapped onto the same or similar superficial structures. Whether such structures are similar in all languages, or each language has its own unique set, is not quite clear at the moment until comparative studies are conducted. It is a fact that the underlying structures that languages can have are infinite, but the superficial structures are not. This may be the reason why we have so few superficial word order patterns in natural languages e.g.

- i) Subject      Object      Verb (S.O.V.)
- ii) Subject      Verb      Object (S.V.O.)
- iii) Verb      Subject      Object (V.S.O.) (cf. Greenberg  
(1966))

These possibilities are so few that one would expect diverse structures to converge on the surface. Yet the convergence is not random; it has to be systematic, otherwise there would be no possible explanation for such a phenomenon. This further implies that the rules that create such structures would be expected to share some properties too. And finally, the correctness of the notion of target structures should throw some light on the phenomena of opacity and transparency in grammar.

THE TYPE OF STRUCTURES WE ARE INTERESTED IN

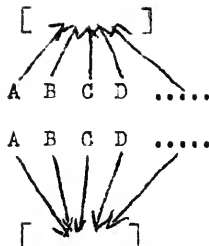
These structures are the type which assume that same configuration at the surface, but which derive from very different logical or semantic structures. The two diagrams below represent this one process, there is no directionality involved:

gross surface forms

logical/semantic structures

or logical/semantic structures

gross surface forms



The main issue is how to account for this phenomenon in a way consistent with the theory of generative grammar.

This kind of phenomenon has been noted in generative grammar; in generative phonology (Ross 1969, Kisseberth 1969a, b, and Kim 1969), and in generative semantics (Lakoff 1969a, b; and Green 1970, 1971). All of the examples discussed have shown that we would need more than a single constraint or rule to predict the correct forms. That is, several constraints, or rules, functioning as a set, or separately, to derive the correct forms. This is summed up in Green (1970: 270) :

"Kisseberth and Ross have referred to the situation where several independently required rules have the same effect as 'a conspiracy of rules', as if the several rules were conspiring to bring about the particular effect. The effect has been referred to as a target structure".



### APPROACHES TO THE ISSUE

There are at least four ways to deal with it. Two of these have had proponents in the generative grammarians camp, the third is what is being proposed here, and the fourth position represents the unconcerned attitude. These approaches are:

- i) that the phenomenon is an accident, and there's nothing to it;
- ii) Emond's structure-preserving hypothesis;
- iii) Perlmutter-Postal grammar-based syntax;
- iv) the target structure hypothesis at a pre-surface level.

Each of these approaches will be looked at in relation to the Yorubá data, after the data itself has been presented.

### RELEVANT BACKGROUND INFORMATION IN YORUBA

Yorubá is one of the Kwa languages of West Africa, of the larger Niger-Congo group (see Greenberg (1966)). At the level of the surface structure, the word order is Subject, Verb, Object (S.V.O.). Besides the imperatives and some embedded relative constructions, the sentence always has a subject. And with the exception of sentence fragments like short replies to questions where a single noun phrase will do for an answer, the verb is always present in a sentence.

Next is the structure of the noun phrase which is our primary concern in this paper. The surface order of words is the mirror image of the English noun phrase structure. It is:

(Plural    Noun    Gerundive    Ideophone    Numerals    (Demonstratives)    (Emphat  
              Marker)                Adjective                                (Determiners)                Marker)

It is quite possible to have a loaded noun phrase where all these elements are present. An example is:

- (1) Àwon Ọkùnrin gíga gòngònròn m̀eta yẹn náà  
 (pl.) men tall stout three those the  
 (they noun ger.adj ideophone num. dem. emph)  
 Those three stout tall men  
 (emphatic marker conveys the sense of previous mention)

The order becomes clumsy, bordering on unacceptability when the elements are reshuffled. The following are not so good.

- (2) ?\* àwon ọkùnrin m̀eta gíga gòngònròn yẹn náà  
 (they men three tall stout those the)  
 Those stout tall three men.
- (3) ?\* àwon ọkùnrin m̀eta gòngònròn gíga yẹn náà  
 (they men three stout tall those the)  
 Those stout tall three men
- (4) ?\* àwon ọkùnrin gíga m̀eta gòngònròn yẹn náà  
 (they men tall three stout those the)  
 Those stout three tall men
- (5) ?\* àwon ọkùnrin gòngònròn m̀eta gíga yẹn náà  
 (they men stout three tall those the)  
 Those tall three stout men

This does not necessarily prove however that there can never be acceptable sentences where the order can be reversed, especially if the load is reduced. This strict adherence to a fairly rigid order may be sensitive to this heavy load. In any case, we will keep this order for the purpose of this paper.

Yoruba does not have underived predicative adjectives, the adjectives are derived via the process of gerundive reduplication. Omitting much details, this is by prefixing a syllable which consists of the first consonant of the verb or adjectival verb stem and a high toned /í/, to the stem, e.g.

$$C_1 + \acute{í} + C_1 V \dots \quad (C \text{ is a consonant, and } V \text{ is a vowel})$$

(verb or adjectival verb)

At the surface the Yoruba complementizers appear in three forms:

- i) (pé) kí 'that' -- both can combine as one unit
  - ii) pé or kí 'that' -- each as a unit
  - iii) láti or sometimes àti 'for ... to'
- (The matrix verb would determine the manner of occurrence of these elements.)

Although (pé) kí, pé and kí translate as 'that', there is a semantic difference between them. They do not always mean the same thing or take the same main verb. The pé-complements are Indicative (cf. English that

+ Indicative), while the kí-complements are generally indirect requests (cf. English that + subjunctive).

The relative clause marker in Yoruba is tí -- 'that', 'who', 'when', 'why', 'which', ..... Strictly speaking, it has no semantic load. It compares with the WH in English.

#### THE YORUBA DATA

From the background information it is clear that a typical noun phrase structure is:

##### Noun + Qualifier

The particular qualifier that we are interested in this instance, will be the form with the shape of a gerundive adjective modifying the head noun. Second, the types of sentences which will give us multiple readings are those with certain verbs of mental state in the matrix sentence. We have listed three verbs here for our purposes, but there may be more; an increase in number will not invalidate our findings at all. The verbs are:

- i) fẹ̀rọ̀n - 'likes', 'loves'
- ii) gbádún - 'likes', 'loves', 'be fond of'
- iii) kóríra - 'hates', 'dislikes'

The following groups of sentences are presented according to the number of readings they give. Those that give the maximum number of readings come first, and then those that give fewer readings. No importance is attached to this order of presentation; it may aid in exposition.

- (6) Olú fẹ̀rọ̀n ẹ̀rọ̀n sísẹ̀  
 (Olu likes meat cooking/cooked)  
 Olu likes cooking meat.

This sentence is semantically ambiguous in very many ways in Yoruba. The ambiguity rests squarely with the structure,

ẹ̀rọ̀n	sísẹ̀
meat	cooking/cooked

where sísẹ̀ is either a gerund on its own from a complement source, (in English, marked by a present participle); or a gerundive adjective, from a relative clause source (in English, marked by a past participle). The following are possible readings of (6), and are evidence for the semantic ambiguity. Later, we shall discuss the nature of the rules that derive a sentence like (6).

- (6) a. Olú fẹròn látí mǎa sẹ ẹròn  
(Olu likes to usually cook meat)  
Olu likes to cook meat.
- b. Olú<sub>4</sub> fẹròn pé kí ọ́í mǎa sẹ ẹròn  
(Olu likes that he usually cook meat)  
Olu likes it that he usually cooks meat.
- c. Olú fẹròn pé kí a mǎa sẹ ẹròn  
(Olu likes that we usually cook meat)  
Olu likes it that we cook meat.
- d. Olú fẹròn pé kí èyẹ̀n mǎa sẹ ẹròn  
(Olu likes that people usually cook meat)  
Olu likes it that people cook meat.
- e. Olú fẹròn ẹròn pé kí a mǎa sẹ̀ é  
(Olu likes meat that we usually cook it)  
Olu likes meat for us to be cooking it.
- f. Olú fẹròn ẹròn pé kí èyẹ̀n mǎa sẹ̀ é  
(Olu likes meat that people usually cook it)  
Olu likes meat for people to be cooking it.
- g. Olú fẹròn pé kí ẹròn mǎa sẹ̀  
(Olu likes that meat usually cook)  
Olu likes for meat to boil.
- h. Olú fẹròn ẹròn tí ọ́ sẹ̀  
(Olu likes meat which it (meat) cooked)  
Olu likes meat which is cooked.
- i. Olú fẹròn ẹròn tí a sẹ̀  
(Olu likes meat which we cooked)  
Olu likes meat which has been cooked.
- j. Olú fẹròn ẹròn tí èyẹ̀n sẹ̀  
(Olu likes meat which people cooked)  
Olu likes meat which has been cooked.

In these sentences, a and èyẹ̀n 'we' and 'people' respectively, do not refer to any specific people (cf. English general you, or sometimes we). Some Yoruba scholars have timorously suggested that the a-sentences are our passive form since we do not have the English by-passive form. In these contexts, a and èyẹ̀n are interchangeable. In some other contexts they are not. Some examples are:

- i) A kọ ìwé yí látí Urbana  
(We wrote this letter from Urbana.)
- ii) \*Èyẹ̀n kọ ìwé yí látí Urbana  
people wrote this letter from Urbana
- iii) Látí Urbana ni a tí kọ ìwé yí  
from Urbana is we have written this letter

- iv) \*Láti Urbana ni èèyòn ti kọ ìwé yí  
       from Urbana is people have written this letter
- v) Ìwé yí láti Urbana ni a ti kọ ọ  
       letter this from Urbana is we have written it
- vi) \*Ìwé yí láti Urbana ni èèyòn ti kọ ọ  
       letter this from Urbana is people have written it

In (ii), (iv), and (vi), èèyòn has specific reference, and require that we mention the doer(s). Furthermore, the indefinite a interacts with won 'they' which also has indefinite reference. They have the same distribution in the sentences we have just looked at:

- vii) Wọn kọ ìwé yí láti Urbana  
       they wrote letter this from Urbana
- viii) Láti Urbana ni wọn ti kọ ìwé yí  
       from Urbana is they have written letter this
- xi) Ìwé yí láti Urbana ni wọn ti kọ ọ  
       letter this from Urbana is they have written it

Furthermore, a and èèyòn behave differently under reflexives; but won pairs with èèyòn rather than a:

Bàbá	fẹ̀ròn	pé kí	a	máa	ṣe	ẹ̀ròn	láti	ọ̀wọ̀	ar	wa/* <u>won</u>
father	likes	that	we	usually		meat	ourselves/*themselves			
.....	<u>èèyòn</u>	.....							won/*wa	
	people								themselves/*ourselves	
.....	wọn	.....							won/*wa	
	they								themselves/*ourselves	

And finally, máa is the habitual marker ('usitative'). We translate it as 'usually'; it could be that this is not the actual equivalent. It doesn't change the meaning anyway.)

Approximately, we have eight different readings for the sentence (6). (6e) and (6f) are derived from (6e) and (6d) respectively by copying ẹ̀ròn 'meat' from its embedded object position onto the object position in the matrix sentence; but a pronoun copy is left behind. (6a) and (6b) mean the same thing, the difference is in the type of complementizers each takes. There seems to be a slight possibility that the a-sentences (6c, 6e, 6i) could be inclusive, but this is not very obvious.

The eight readings fall into two pairs of sets. In one pair, (6a) - (6g) give the complement readings, while (6h) - (6j), give the relative

clause readings. In the second pair of the sets, the verb sè 'cook' is [+ TRANSITIVE, - STATIVE] from (6a) - (6f), while it is [-TRANSITIVE, + STATIVE] from (6g) - (6j). The first pair maintains a beautiful dichotomy between complements and relative clauses; but the second overlap slightly in (6g); otherwise both groups would have been just one single pair. Stated simply, the verb sè in (6a) - (6j) is

$$\left[ \begin{array}{c} + \text{ transitive} \\ + \text{ stative} \end{array} \right]$$

The following sentences could be analysed to give the same multiple readings of (6).

- (7) Adé kóríra kòkó bíbà  
(Ade hates cocoa fermenting/fermented)  
Ade hates fermenting/fermented cocoa.
- (8) Olùkòni fẹròn ilé jífó  
(Teacher likes house burning/burned)  
Teacher likes burning/burnt houses.
- (9) Mọmọ gbádùn èlùbọ lílò  
(Mother loves yam boiling/boiled)  
Mother loves boiling/boiled yams.
- (10) Mo kóríra ẹròn bíbọ  
(I hate meat boiling/boiled)  
I hate boiling or boiled meat.

The next set of sentences are those that will permit only the complement readings, at least in this context. The gross surface form is still

$$\text{Noun } C_1 + \text{f} + C_1 \text{V} \dots \text{verb}$$

- (11) Àwọn ọlópá kóríra rọbà títa = títa rọbà  
(they police hate rubber flinging/flinging rubber)  
The police hate using sling shot.

The sentence (11) will permit the following readings.

- (11) a. àwọn ọlópá kóríra láti máa ta rọbà  
(they police hate to usually fling roba)  
The police hate for them to use sling shot.
- b. àwọn ọlópá<sub>1</sub> kóríra pé kí wọ<sub>1</sub> máa ta rọbà  
(they police hate that they usually fling rubber)  
The police hate for them to use sling shot.
- c. àwọn ọlópá kóríra pé kí a máa ta rọbà  
(they police hate that we usually fling rubber)  
The police hate for us to use sling shot.

- d. àwọn ọlọpá kóríra pé kí èyàn máa ta rọbà  
(they police hate that people usually fling rubber)  
The police hate for people to use sling shot.
- e. àwọn ọlọpá kóríra rọbà láti máa ta á  
(they police hate rubber to usually fling it)  
The police hate sling shot for them to use it.
- f. àwọn ọlọpá kóríra rọbà pé kí a máa ta á  
(they police hate rubber that we usually fling it)  
The police hate sling shot for us to fling it.
- g. àwọn ọlọpá kóríra rọbà pé kí èyàn máa ta á  
(they police hate rubber that people usually fling it)  
The police hate sling shot for people to use it.
- h. \*\*àwọn ọlọpá kóríra pé kí rọbà máa ta  
(they police hate that rubber usually fling)  
The police hate for sling shot to use.

(for rubber to fling may make sense only if the agent is not the rubber; but this is ruled out here since the sentence has rubber as the agent.)

- i. \*\*àwọn ọlọpá kóríra rọbà, pé kí ó, máa ta  
(they police hate rubber that it usually fling)  
The police hate sling shot for it to use.

(We suspect that 'fling' may not be the correct translation for ta in these sentences since this interacts with cross-linguistic grammaticality.

Second, the Yoruba verb kóríra does not seem to be sensitive to the presence of complementizers -- the English verbs hate and like do. This does not affect the issue anyway.) In the same manner, the following sentences could be analysed to give the same multiple readings of (11).

- (12) Ọré mi gbádùn oko ríro = (ríro oko)  
(friend my likes farm hoeing hoeing farm)  
My friend likes hoeing farm.
- (13) Ègbón mi obínrin fẹrẹn omọ wíwẹ = wíwẹ omọ  
(senior my female likes child washing washing child)  
My sister likes washing babies.
- (14) Àlùfáa gbádùn àdúrà gbígba = (gbígba àdúrà)  
(priest likes prayer saying saying prayer)  
The priest likes saying prayers.
- (15) àwọn ẹlẹwọn kóríra kòtò gbígbe = (gbígbe kòtò)  
(they prisoners hate pit digging digging pit)  
The prisoners hate digging pit.

The sentences from (11) - (15) consistently maintain the two possible variants, that is, the gerund alternating freely between before the noun and after the noun. This will be discussed later.

The final set of sentences give only the relative clause reading (in this context). This reading is excluded totally from (11) - (15). The derivation of the gerundive compound is still the same, and the surface structure sequence is still NOUN + CíCV.....  
verb

The verbs that permit these readings are the stative verbs, which in Yoruba are referred to as adjectival verbs. They have the features

[-transitive]  
[+stative]

- (16) Olùbẹ̀wò kóríra ọmọ́ lílẹ̀  
inspector hates child difficult

Sentence (16) will permit only one reading, that is, with an underlying relative clause. Two complement sentences are presented here to further prove our point that complements are excluded.

- (16) a. Olùbẹ̀wò kóríra ọmọ́ tí ó lẹ̀  
(inspector hates child that he difficult)  
The inspector hates a difficult child.
- b. \*Olùbẹ̀wò kóríra pé kí ọmọ́ lẹ̀  
(inspector hates that child difficult)  
The inspector hates for a child to be difficult.
- c. \*Olùbẹ̀wò kóríra ọmọ́ pé kí ó lẹ̀  
(inspector hates child that he difficult)  
The inspector a child for him to be difficult.

Sentences (16b) and (16c) are ungrammatical relative to this context, that is, they do not mean what (16a) means. In (16a) the inspector hates a child who is difficult, in (16b) and (16c), the inspector hates the fact that a child be difficult. This is why we reject both (16b) and (16c) in this context, otherwise they are grammatical sentences in the language.

Some more examples are:

- (17) Àiyá gbádùn ògèdè pípọ̀n  
(monkey loves banana ripe)  
The monkey loves ripe banana. (generic)
- (18) A fẹ̀rọ̀n Ọlórún mímọ̀  
(we love God clean)  
We love the holy God.
- (19) Àwọ̀n oníwòsàn kóríra ara rírùn  
(they doctors hate body smelling)  
Doctors hate a smelling body.



- (20) Mo gbádùn ẹrọn dídùn  
 (I love meat sweet)  
 I love sweet meat.

Sentences (16) - (20) do not place any restrictions on the matrix verbs. A choice of other verbs will not affect grammaticality nor the sense we have been looking at. We retain our verbs for the sake of consistency.

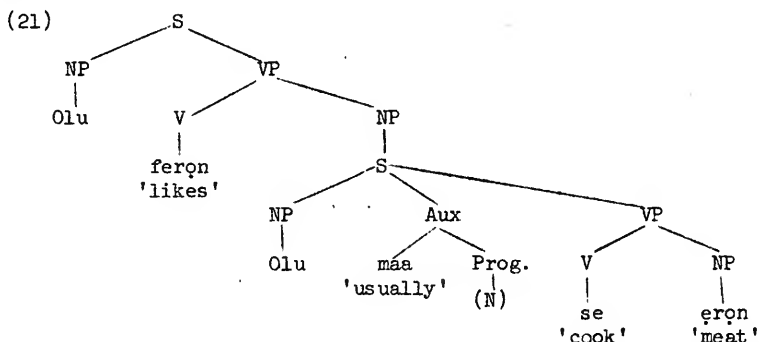
We hope we have presented enough data to really expose the problem and to show by the enormity of the data how utterly ridiculous it would be to dismiss the issue. Any theory of grammar must come to grapple with this type of phenomenon.

Curiously enough English also reflects our judgement on grammaticality of the Yoruba sentences. Except that English preserves the distinction between present and past participles morphologically, and also that in Yoruba the gerund hops on the noun, otherwise the semantic ambiguity is true of English too. In the following section we will present the derivation of these sentences.

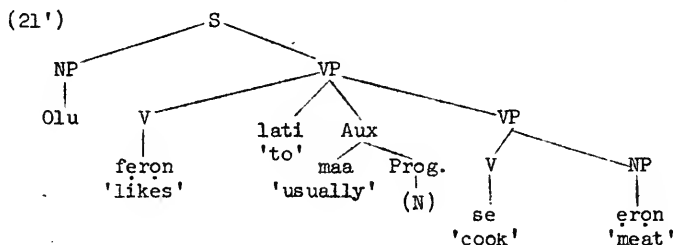
#### DERIVATION OF THE SENTENCES

In order to see how these sentences end up looking alike at the surface it will be necessary to look at them individually, see what deletion or movement rules they undergo, and finally the relationship between such rules. It is after this task is successfully accomplished that we can offer an explanation for the phenomenon. Note that implicit in the concept of target structures (explicitly in generative grammar), is the claim that between the logical structures and the surface structures are a set of sets of rules which produce the target structures. It could be that the rules share many properties, e.g. applying cyclically, applying over variables, being governed, being obligatory, etc. There must be something in the nature of these rules, or in their operation, which triggers gerundive reduplication, and thus seals from the surface any trace of the different underlying sentences. Second, we could speculate further that there must be something which is responsible for the complement structures, to encroach upon the position of the gerundive adjective. The consequence is that two semantically distinct structures

gerund before the noun, and gerundive adjective behind the noun -- end up in the same position at the surface; that is, behind the head noun. The deep structure of (16a) is (21):



By Forward Equi-NP-Deletion (see p. 15), the second Olu is deleted, which reduces the embedded sentence to an infinitival phrase introduced by lati:



The derivation in (21') is very ungrammatical as it, yet it has to be the correct derivation at that point. The non-acceptability is because of co-occurrence restriction which does not permit the complementizers pé kí 'that' and látí '(for)...to', on the one hand, and the progressive marker, on the other, to occur together in any well-formed sentence of Yoruba. They are mutually exclusive. One could think at first that it was the habitual marker, máa, which was causing the blockage, but both máa and the complementizers can co-occur, both máa and the prog. marker can also co-occur, only the complementizers and the prog. marker cannot. The following sentences are our evidence.

- 1) Olú fẹrọ́n látí máa se ẹrọ́n (6a)  
likes to usually cook meat

- ii) Olú fẹ̀rọ̀n pé kí Olú máa se ẹ̀rọ̀n (6b)  
 ( likes that usually cook meat)
- iii) Olú fẹ̀rọ̀n kí Olú máa se ẹ̀rọ̀n (6b)
- iv) \*Olú fẹ̀rọ̀n láti máa ń se ẹ̀rọ̀n  
 ( likes to usually be ing cook meat)
- v) \*Olú fẹ̀rọ̀n pé kí Olú máa ń se ẹ̀rọ̀n  
 ( likes that Olu usually be ing cook meat)
- vi) \*Olú láti ń se ẹ̀rọ̀n  
 (Olu to be ing cook meat)
- vii) Olú máa ń se ẹ̀rọ̀n  
 ( usually be ing cook meat)  
 Olú usually cooks meat.
- viii) Olú máa se ẹ̀rọ̀n (future)  
 (Olu fut. cook meat)  
 Olu will cook meat.
- ix) Olú ń se ẹ̀rọ̀n  
 be cooking meat
- x) \*Olú fẹ̀rọ̀n pé kí Olú ń se ẹ̀rọ̀n  
 (Olu likes that Olu be ing cook meat)

'Olu likes for Olu to be cooking meat' is possible in English, but impossible with the combinations we have in (x).

- xi) \*Olú fẹ̀rọ̀n láti Olú ń se ẹ̀rọ̀n  
 ( likes for Olu to be cooking meat) (possible only in English)

The restrictions here could be language-specific since English does not permit some of the combinations that Yorùbá allows without change of meaning; and Yoruba too rejects some of the English combinations. For example, máa 'usually' and ń (prog.) in (vi), are permissible in Yoruba, while 'usually' cannot surface in English. Then in (xi) where láti 'for ... to' blocks in Yoruba but goes through in English.

Be it as it may, the complementizers (pé kí, and láti) and the progressive marker (ń/ń) cannot co-occur in a well-formed Yoruba sentence, but both have to be present at the deep structure, especially the progressive marker since its presence or absence makes a semantic difference (see (viii) and (ix)). The indicative complementizer, pé, however co-occurs with the progressive marker. This is another difference between pé and kí.

We suspect very strongly that it is the co-occurrence restrictions between pé kí, láti and máa, on the one hand, and the progressive

marker, n/m, on the other, which triggers the early deletion of the latter. Note that in all the complement sentences which we have from (6) - (15), the progressive marker never shows up at all. We could set up the following co-occurrence patterns:

<u>Complementizers</u>		<u>Habitual/future marker (maa)</u>	<u>Prob. marker (n/m)</u>
(pé) kí	'that'	x	--
kí	'that'	x	--
lāti/āti	'to'	x	--
pé	'that'	x	✱

Of all the complementizers, pé has wider co-occurrence patterns than the others; it co-occurs with kí, n/m, and maa. Why this is so is not quite obvious. In terms of functions however, we have the following patterns:

<u>pé</u>	<u>declarative</u>	e.g. o sọ pé wọn wá (he said that they came)
	<u>factive</u>	e.g. A mò pé o dé (we know that you arrived)
<u>kí</u>	<u>non-factive</u>	e.g. Ó se pàtàkì kí o wá (it is important that you come)
	<u>desiderative</u>	e.g. A fẹ kí ẹ wá (we want that you come)
<u>pé kí</u>	<u>desiderative</u>	e.g. A fẹròn pé kí o yege (we like that you succeed)
<u>lāti</u>	<u>desiderative</u>	e.g. A kófíra lāti dānā (we hate to cook)

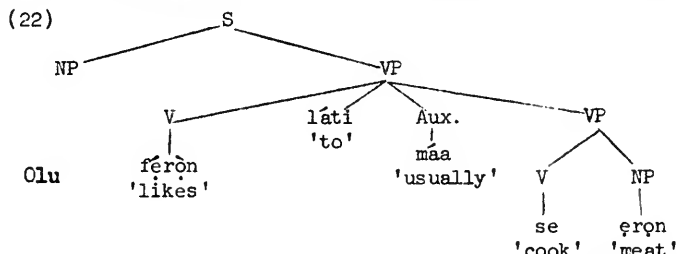
With the early deletion of the progressive marker, in all the sentences in (6), we have our first rule:

'the progressive marker deletes whenever in construction with the complementizers'

It has the following properties:

- i) it is governed by the complementizers
- ii) it is obligatory
- iii) it does not deal with variables
- iv) it does not change grammatical relations
- v) most likely a very early cyclic rule

The second rule that applies in (21) is Forward Equi-NP-Deletion, which deletes the second Olú (subject of the embedded sentence), and renders the embedded sentence subjectless at that stage. Ross' sentence pruning convention then wipes out the dangling S. This derives (6a):



Forward Equi-NP-Deletion rule is a very general rule in Yoruba as well as in generative grammar. It reduces its victim to an infinitive phrase generally introduced by láti or àti 'to'. It has the following properties:

- i) it is obligatory
- ii) it is governed by the main verb
- iii) it is cyclical
- iv) it does not deal with variables
- v) it does not change grammatical relations.

It does not seem to be of great consequence to order any of the two rules before the other since their domains are so different; neither triggers the other.

To derive (6b)

(6b) Olú<sub>i</sub> fẹròn pé kí o<sub>i</sub> máa se ẹrọn  
 ( likes that he usually cook meat)

again, two totally unrelated rules apply, (i) progressive marker deletion and (ii) pronominalization of the second Olú, the embedded subject.

Pronominalization has the following properties:

- i) not obligatory
- ii) does not change grammatical relations
- iii) not governed
- iv) not cyclic
- v) but deals with variables.

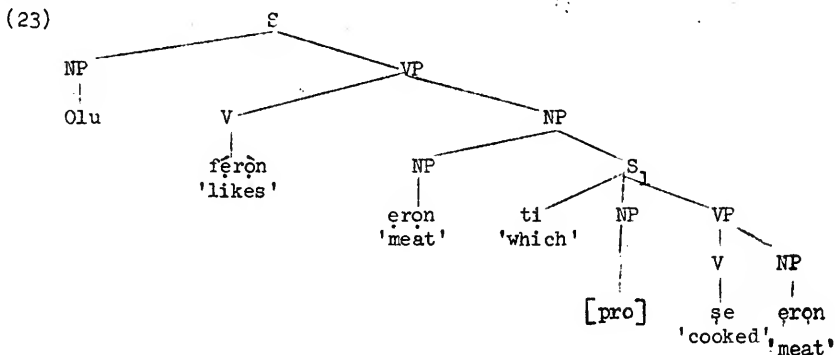
Both (6c) and (6d) merely undergo the progressive marker deletion and nothing more. The subject of the embedded sentence in (6c), a, is not an instance of pronominalization (see p. 5).

Both (6e) and (6f) are instances of some kind of object copying from the embedded sentence on to the matrix sentence.<sup>3</sup> But it leaves a pronoun copy behind. Thus in the derived sentence, the matrix verb has a direct object, erɔn 'meat'. The following are the properties of this rule:

- i) it is optional
- ii) it is governed by the main verb
- iii) does change grammatical relations (object of embedded sentence becomes direct object of matrix sentence)
- iv) cyclical
- v) does not deal with variables.

This rule has to apply before the rule that puts a pronoun copy in the original place of the embedded object, erɔn, 'meat'. (6g) only undergoes progressive marker deletion. The rules we have thus far would derive all the complements sentences from (6) - (15). Except for the progressive marker rule, which at the moment looks like a language-particular rule, all the others are familiar rules of generative grammar.

The sentences (6h) - (6j) come from restrictive relative clause sources. (23) is the deep structure of (6h). Both (6i) and (6j) would have a similar deep structure, but with different subjects in the embedded sentences.



The embedded ẹ̀rọ̀n pronominalizes to ó 'it', and (6h) is derived.

Both (6i) and (6j) have the second ẹ̀rọ̀n 'meat' as their object. It deletes in this position and renders the verb se 'cooked' superficially intransitive at the surface.

The following are the rule employed in the derivation of both the complement and the relative clause constructions so far:

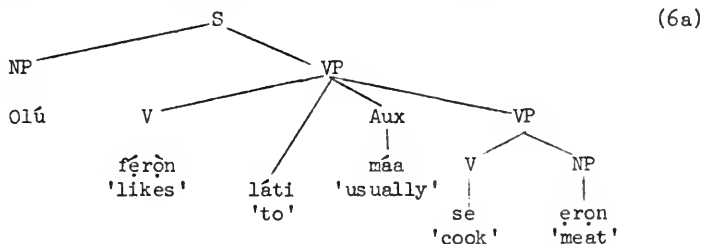
- i) progressive marker deletion (seems language-specific)
- ii) Forward-Equi-NP-Deletion (general)
- iii) Object copying (general)
- iv) Pronominalization (general)
- v) Pronoun Copying (general)

(We are using the term 'general' to imply that the rules are familiar in generative grammar, and also apply fairly extensively in Yoruba as well as in many other languages.)

The rules that apply up to this point are deletion rules. We have not attempted to order them since this is not quite consequential. But though they derive all the sentences in (6), they do not produce the target sentence with the gerundive reduplication:

- (6) Olú fẹ̀rọ̀n ẹ̀rọ̀n síṣẹ̀  
 (Olu likes meat cooking/cooked)  
 Olu likes cooking/cooked meat.

We repeat (22) here to make our discussion simpler:



Both lāti and máa have to delete, and the structure undergo gerundive reduplication before (6) can be derived. As it is, (6a) or (22) is perfectly grammatical and acceptable, but nothing else must delete from that structure. If lāti or máa should delete, that derivation must be thrown away.

Up to this point, we have taken for granted the presence of the so-called complementizers. Under Rosenbaum (1967)'s analysis, these elements were inserted rather arbitrarily by a complementizer placement rule. Kiparsky and Kiparsky (1968) however, have shown that infinitives (introduced by lāti in Yoruba) are derived automatically when their subject disappears either by deletion (e.g. Equi-NP-Deletion) or by movement. While this formation of the infinitives is restricted mostly to factive and emotive verbs, it does not explain the presence of pé kí, pé and kí 'that', which is assumed in this paper to be underlying. This means that while we do not need a complementizer placement rule we certainly need some kind of complementizer deletion rule to account for the disappearance of the that-complementizers in Yoruba.

Note that English requires a similar deletion rule too to account for:

- i) He likes [<sub>S</sub> He run]
- ii) He likes to run (i) Equi-NP-Deletion (ii) Infinitivization
- iii) He likes running (iii) gerund formation
- iv) He predicts [that he will die]
- v) He predicts [he will die] (i) that-deletion
- vi) He predicts [his dying] (ii) gerund formation

The deletion of to in (ii) destroys the structure without the gerund; similarly, the deletion of that in (v) paves the way for the future marker, will, to take its turn. We speculate therefore that it is the deletion of lāti in (22) which triggers the deletion of the habitual marker, máa. The fact that both to and that can delete in (i) - (vi) is another motivation for positing complementizer deletion rule through cross-linguistic evidence. The following are some of its properties:

- i) it is optional
- ii) it is governed by the verb
- iii) it does not change grammatical relation
- iv) it is probably cyclical
- v) it does not deal with variables

This rule deletes both lāti and pé kí, in all the complement sentences,

With the deletion of the complementizer in (22) we get an ungrammatical sentence:



- (23) \*Olú fẹrọn máa se ẹrọn  
 Olu likes usually cook meat

yet it seems structurally closer to the target sentence than (22).

Our contention now is that it is the disappearance of máa which triggers the gerundive reduplication. If after its disappearance gerundive reduplication does not apply, the sentence will block and may be thrown out since very important semantic information will be lost finally. The semantic information which must be saved to save the derivation is the fact of habitualness of cooking. Gerundive reduplication therefore applies to se 'cook' to preserve the information of habitualness. It has to apply to the verb rather than any other word since it is the verb which carries the meaning of cooking. This seems to be a very strong motivation for this strange interaction between syntactic and morphological rules, at so late a stage in the derivation. It is interesting that there is a semantic basis for the interaction.

There are two sides to the fact of the disappearance of máa. It could be claimed to be a separate deletion rule which triggers gerundive reduplication; or that gerundive reduplication is a global process<sup>4</sup> which has to refer to máa before it applies on the verb.

Note that it does not seem feasible to generate both the aspect markers máa and ń/ń -- and the reduplicated form of the verb all at the base. They are mutually exclusive, as the following show:

- (24) Olú máa ń se ẹrọn  
 (Olu usually be cook meat)  
 \*Olu is usually cooking meat. (blocks for Eng. since (24) means "Olu usually cooks meat.")
- (25) Olú máa se ẹrọn  
 (Olu fut. cook meat)  
 Olu will cook meat.
- (26) Olú ń se ẹrọn  
 (Olu be cook meat)  
 Olu is cooking meat.
- (27) \*Olú máa ń síse ẹrọn  
 (Olu usually be cooking meat)  
 Olu usually is cooking meat.
- (28) \*Olú máa síse ẹrọn  
 (Olu usually cooking meat)  
 Olu usually cooking meat.

- (29) \*Olú ñ şíşe ẹ̀rọ̀n  
 (Olu be cooking meat)  
 Olu is cooking meat. perfect in English
- (30) \*Olú şíşe ẹ̀rọ̀n  
 (Olu cooking meat)  
 Olu cooking meat.

English permits be and -ing and cook; Yorubá does not, strictly speaking -- instead it has only the prefix Cí- for the two English morphemes be and -ing. So we must either permit the dependence of gerundive reduplication on the deletion of máa, or make gerundive reduplication global and sensitive to the presence or absence of máa.

Note that it does not seem quite feasible to make gerundive reduplication depend on the disappearance of the progressive marker, ń/m; since it deletes wherever the complementizers are present (see p. ). And the second point to note is that the gerundive marker, Cí- cannot be generated directly by any form of phrase structure rules. For one thing, while máa and ń/m are independent or free morphemes, and can be dominated by nodes, Cí-, though a bound morpheme, like the English -ing, is not a separate morpheme strictly speaking. It is formed in two steps:

- i) copy the first consonant of the stem;
- ii) add /í/ between the consonant and the stem.

While the -ing form in English is already an entity, and can hop on the verb (cf. affix hopping), the Cí- does not hop; it depends entirely on the verb for its shape. That makes it a little weird and ad hoc to claim that there is a rule which changes

ń/m → Cí-

since we have presented some evidence (see p. ) to show that the progressive marker deletes before máa does, when in construction with complementizers.

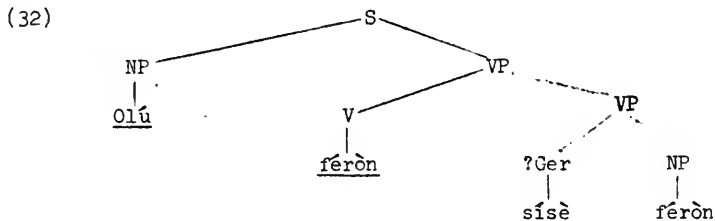
The fact that ń/m deletes before máa does, when in construction with the complementizers however is not a strong reason for tying gerundive reduplication to máa rather than ń/m. It could be the other way round. They both (i.e. máa and ń/m) cannot cooccur with the reduplicated form of the verb (see p. ). We do not therefore rule out the possibility that gerundive reduplication can be just as easily sensitive to the presence of máa as to that of the progressive marker. The most important point is that gerundive reduplication should have access to the information on

the presence or absence of any of these aspect markers -- máa and the progressive marker.

The gerundive reduplication rule seals off the last trace of the embedded sentence on the surface; it makes the derived sentence totally opaque. This opacity is a general characteristic of very many gerundive constructions in Yorùbá. The output of all these operations is:

- (31) Olú fẹ̀rọ̀n síṣẹ̀ ẹ̀rọ̀n = (ẹ̀rọ̀n síṣẹ̀)  
 (Olu likes cooking meat meat cooking)

and



Now we can look at how the other sentences are demolished to derive the target sentence. The three sentences (6b), (6c) and (6d) repeated here below for easy reference, undergo the same rules:

6. (b) Olú fẹ̀rọ̀n pé kí ó máa se ẹ̀rọ̀n  
 (Olu likes that he usually cook meat)  
 (c) Olú fẹ̀rọ̀n pé kí a máa se ẹ̀rọ̀n  
 (Olu likes that we usually cook meat)  
 (d) Olú fẹ̀rọ̀n pé kí èyẹ̀yọ̀n máa se ẹ̀rọ̀n  
 (Olu likes that people usually cook meat)

There are four operations here. They are:

- i) complementizer deletion (wipes out pé kí)
- ii) máa deletion
- iii) embedded subject deletion (wipes out in turn o, a, and èyẹ̀yọ̀n. It is not quite obvious that these are a single operation; they could be three. But their domains are similar.)
- iv) gerundive reduplication

It is not quite obvious that embedded subject deletion be ordered before the first two rules. The rule that deletes o in (6b) is not Equi-NP-Deletion since the latter yields the infinitives.

In any case, gerundive reduplication applies last of all since by the time it applies there should be no other elements of the embedded

sentence to its left if a well-formed complement sentence is to be derived. The fact that sísè can hop on ẹrọn to derive ẹrọn sísè will be dealt with later.

Sentences (6e) and (6f) are derivatives of (6c) and (6d) respectively, by copying ẹrọn on to the object position of the matrix sentence, and leaving a pronoun copy behind. These operations have to apply before gerundivization.

6. (g) Olú fẹrọn pé kí ẹrọn máa sè  
 (Olu likes that meat usually cook)  
 Olu likes for meat to boil.

is derived by placing ẹrọn in the subject position from its original object position. The agent of cooking is not mentioned. A pseudo-passive is thus derived. By making gerundivization global it will have access to the information that while ẹrọn is in the subject position in the derived structure, its original position is in the object position, and so gerundivization is not blocked.

Altogether the following are the rules that apply to produce the surface opacity in the complement structures:

- i) object copying (6e and 6f)
- ii) pronoun copying (6e and 6f)
- iii) replacement of the unspecified subject by the object (6g)
- iv) complementizer deletion
- v) aspect markers deletion (máa and ń/ń)
- vi) embedded subject deletion
- vii) gerundive reduplication

For the sentences (6h) - (6j) repeated below, three rules apply:

6. (h) Olú fẹrọn ẹrọn tí ó sè  
 ( likes meat which it cooked)
- (i) Olú fẹrọn ẹrọn tí a sè  
 ( likes meat which we cooked)
- (j) Olú fẹrọn ẹrọn tí èàyọn sè  
 ( likes meat which people cooked)

They are:

- i) relative marker deletion
- ii) embedded subject deletion (cf. (vi) above)
- iii) gerundive reduplication

And then (6) "Olú fẹ̀rọ̀n ẹ̀rọ̀n síse" is derived.  
 ( likes meat cooked)

#### REMARKS ON THESE DELETION RULES

Among the issues posed by these rules is the status of both the complementizers -pé kí and látí-, and the relative clause marker -tí in these sentences. Why generate or mention them at all when we know they will be wiped out from the target sentence, in the first place? One could almost extend the same question to the aspect markers, except that the latter carry important semantic information, which makes their presence necessary. Secondly, why pronominalize, when the ó in (6b) and (6h) will not reach the surface? These questions are genuine, but since we are primarily interested in the range of meanings that these target sentences can have, we will have to appeal to these elements otherwise we would begin with ungrammatical sentences.

It may be possible that in a grammar that permits transderivational constraints (cf. Lakoff 1970), these complementizers -- pé kí and látí and the relative clause marker, tí, may be left out on the assumption that the information about their existence and their role has been incorporated into the constraints. But whether or not transderivational constraints exist in the grammar is still an issue in generative grammar.

Thirdly, an alternative to the individual deletion rules is to speculate that these deletion rules:

- i) complementizer deletion
- ii) relative marker deletion
- iii) aspect markers deletion
- iv) embedded subject deletion

apply as a single block which wipes clean all the elements between the matrix verb and the embedded verb, in a marked structure, so that gerundive reduplication can apply. This is a possibility, but it will have to be sensitive to whether the structure is a complement, or a relative structure; for the relative sentence, it is everything between the object noun phrase of the matrix sentence and the embedded verb. The following are the victims of this block deletion.

- |      |                                 |   |                            |
|------|---------------------------------|---|----------------------------|
| i)   | - <u>lāti mǎa</u> - (6a)        | ) |                            |
|      | to usually                      | ) |                            |
| ii)  | - <u>pé kí ó mǎa</u> - (6b)     | ) |                            |
|      | that he usually                 | ) |                            |
| iii) | - <u>pé kí a mǎa</u> - (6c)     | ) | Complement structures      |
|      | that we usually                 | ) |                            |
| iv)  | - <u>pé kí èèyòn mǎa</u> - (6d) | ) |                            |
|      | that people usually             | ) |                            |
| v)   | - <u>tí ó</u> - (6h)            | ) |                            |
|      | which it                        | ) |                            |
| vi)  | - <u>tí a</u> - (6i)            | ) |                            |
|      | which we                        | ) | Relative clause structures |
| vii) | - <u>tí èèyòn</u> - (6j)        | ) |                            |
|      | which people                    | ) |                            |

Obviously this block deletion, most probably global in nature, with the information on the particular structures built into it, simplifies the derivational processes. But the trouble with it might be how to formalize it and constrain such a mechanism, so that it knows and does exactly what it is supposed to do. It may sound ad hoc and arbitrary, but it spares us the enumeration of separate rules which do nothing but make gerundive reduplication possible.

We therefore tentatively propose the following deletion convention:

If a verb in the embedded position is marked for gerundive reduplication, before it can apply, the nodes dominating the complimentizers/relative marker, the embedded subject noun phrase, and the Aux, of the sentence, must delete, and the S be pruned.

This convention takes care of both the complement and the relative sentences. While this powerful mechanism does its job, it does not provide any insight into the nature of the surface structure opacity; this is its major weakness. In any case, whether one posits separate deletion rules or block deletion, the marked verb becomes reduplicated after the deletion.

The chart on the next page shows the two groups of rules mentioned in this paper. The rules in A derive the various source sentences; those in B produce the totally opaque target sentences.

A

	<u>Forward Equi-NP</u>	<u>Pronominali- zation</u>	<u>Object Copying</u>	<u>Pronoun Copying</u>
Obligatory	yes	no	no	no
Governed	yes	no	yes	no
Use variables	no	yes	?yes	
Change gram. rels.	no	no	?no	no
Cyclical	yes	no	no	no
Operate in gram. categories	yes	yes	yes	yes

B

	<u>Compl. Del.</u>	<u>Aspects Del.</u>	<u>Embedded Subj. Del.</u>	<u>Rel. Marker Del.</u>	<u>Ger. Redup.</u>
Obligatory	yes	yes	yes	yes	yes
Governed	yes	yes	yes	yes	
Use variables	no	no	no	no	no
Change gram. rels.	no	no	no	no	no
Cyclical	yes	yes	yes	yes	yes
Operate in gram. categories	no	no	yes	no	yes

THE APPROACHES TO THE ISSUE

4a

i) THAT IT IS AN ACCIDENT

The first approach which claims that this phenomenon is an accident is the most vulnerable. It may be a diachronic accident -- there is no way by which we can verify this. But the phenomenon is certainly not a synchronic accident. About five separate deletion rules participate in the process -- their express purpose seems to be to demolish the initial structure and make the derived structure totally opaque, via gerundive reduplication.

Secondly, gerundive reduplication is so productive in the language that this type of phenomenon cannot be easily dismissed.

Thirdly, an outright dismissal of it is a refusal to face it, which does not change the phenomenon. The fact that two closely related structures -- complement and relative structures -- are involved may suggest that it is not a coincidence. Both constructions are forms of embedding in the language.

Fourthly, the fact that English, a totally unrelated language of the Germanic group, has similar structures, further reinforces our contention that the phenomenon is not accidental;

Under the concept of target structures at the pre-phonetic level, this consistent convergence of diverse structures begin to make sense; one may soon be able to explain why the reduplication occurs at the end of the deletion processes as opposed to earlier on.

#### EMONDS' STRUCTURE\*-PRESERVING HYPOTHESIS

ii) It seems hard to see how the structure-preserving hypothesis can explain this total disruption of structures rather than preservation of the structures. Deletion rather than movement is what is largely involved here. Each of the source sentence undergoes a complete disruption of the embedded sentence, so that at the surface we have a totally opaque gerundive construction. We start with two sentences and end up with one.

We do not claim however that Emonds' hypothesis cannot derive the source sentences. One can do almost anything with his hypothesis. It allows empty nodes to be generated by the phrase structure rules so that constituent(s) can be moved into them later in the derivation. So to derive (6e):

Olú	fẹ̀rọ̀n	ẹ̀rọ̀n	pé kí	a	máa	sè	é	
Olu	likes	meat	that	we	usually	cook	it	

from (6c)

Olú	fẹ̀rọ̀n	pé kí	a	máa	se	ẹ̀rọ̀n
Olu	likes	that	we	usually	cook	meat

one would have to generate an empty NP node into which ẹ̀rọ̀n can be copied while it leaves a pronoun copy behind.

Most of the examples of transformations cited in support of Emonds' theory are movement or replacement types rather than deletion transformations.



While the hypothesis can derive some of the sentences, it cannot explain this non-preservation of structure at the highest S's.

### iii) PERLMUTTER-POSTAL GRAMMAR-BASED SYNTAX

This type of abstract syntax hypothesizes that the rules of grammar fall into two groups -- cyclic and non-cyclic rules. The cyclic rules apply first. Some of these rules are passive, subject raising, there-insertion, negative-raising, dative movement (cf. Green & Morgan (1972)). These rules change grammatical relations, they do not use variables, they can feed each other, and they are governed.

The non-cyclic rules on the other hand do not change grammatical relations, they use variables, they are not governed, and they operate in grammatical categories. Some examples are relativization, adverb preposing, complement formation, etc. It is possible that such an abstract view of syntax could derive most of the sentences we have already looked at. The prediction of this hypothesis seems to be that if these two types of rules apply in that sequence, our target structure should be derived. But it is not so obvious that our deletion rules fall neatly into the dichotomy of cyclic and non-cyclic rules, which sequence would yield the target structures. Again the fact that rules may apply in the specified sequence may not necessarily mean the target structures would be produced. It is difficult therefore, to base specific claims about what structures to expect to converge, on this type of hypothesis. It is not likely to explain the gerundive phenomenon.

### iv) THE NOTION OF TARGET STRUCTURES AT A PRE-PHONETIC LEVEL

This notion, whose precise formulation remains unclear at the moment, stands on the merit that it provides a possible explanation for what the other approaches can derive but cannot explain. There are two questions that need to be answered by any of these approaches:

- i) why do we have this totally opaque gerundive structure at this level, so late in the derivation?
- ii) why does the gerund in Yoruba hop on the following noun to assume the position of a gerundive adjective?

Note that these issues arise at the same level or point in the derivation, so they go together. A Yoruba grammarian, Awobuluyi (1967), writes:

"it is stylistically preferable to reverse the order of the first two elements in

- i) jíjẹ onjẹ tó yín  
eating food be enough for you
- ii) pípa iró jẹ ohun ìtìjù  
telling lies is a thing of shame  
such that we end up with
- iii) onjẹ jíjẹ tó yín  
food eating be enough for you
- iv) iró pípa jẹ ohun ìtìjù
- v) iró pípa jẹ ohun ìtìjù  
lies telling is a thing of shame" (page 126)

None of these grammars has explanation for this hopping or interchange, except that it is stylistic. Interestingly enough, the marked order<sup>5</sup> -- gerund after the noun (the position of the gerundive adjective) -- becomes 'preferable' to the normal order. Even if this phenomenon is stylistic, why does it work one way and not the other, that is, have the gerundive adjective hop backward on the noun to assume the position of the proper gerunds?

These are cogent questions that the other analyses must attempt to answer too. To simply accept that the two positions are mere variants for the proper gerunds would amount to saying that this phenomenon is an accident.

Speakers do know the difference between a gerund before a noun, and a gerundive adjective after a noun; and when these two patterns converge the semantic distinction is still preserved in utterances, e.g.

- |  |  |  |
|--|--|--|
| <p>erọ́n síṣẹ̀<br/><u>meat cooking</u><br/>(noun ger. form)<sup>6</sup><br/>(the target structure)</p> |  | <p>i) erọ́n síṣẹ̀ = síṣẹ erọ́n<br/>meat cooking cooking meat<br/>(noun <u>gerund</u> <u>gerund</u> noun)</p> <p>ii) erọ́n síṣẹ̀<br/><u>meat cooked</u><br/>(noun <u>ger. adj.</u>)</p> |
|--|--|--|

How does such a situation arise? One could speculate that this situation arises by syntactic analogy -- that is, that speakers analogize on the basis of the noun plus gerundive adjective pattern, and start hopping the gerunds on the noun. This argument boils down to chance too.

In many respects, relativization and complement formation are related since they are both a means of embedding. In the particular contexts we have been looking at, the complement structures are much more general than the relative structures:

- i) the complement structures permit more multiple readings;
- ii) permit both specific and non-specific NP's to be subjects of the embedded sentences; only non-specific NP's can occur in the relatives.
- iii) the complement structures generalize to two patterns at the surface; the relatives are limited to one.
- iv) the complement structures have at least three options of complementizers; the relatives have just one.

These points, mostly language-specific, might lead one to speculate that the complement structures are probably older than the relative clauses; and further that in language acquisition the kid acquires the complement structures earlier than the other. Whether the generality of the complement structures would affect the direction of language change is hard to say at the moment. But it is obvious that the marked order for the complement structures -- noun plus gerund -- is now prepared to the unmarked order -- gerund plus noun. The unmarked order is the underlying order of the elements, e.g.:

Olú fẹ̀rọ̀n [s Olú se iṣe]  
 Olu likes Olu cooked yam

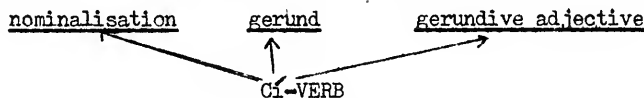
where se precedes the object. But on the surface, siṣe 'cooking/cooked' ends up behind the noun. We could speculate that in making the distinction between the complement and the relative structures, the brain processes them according to the underlying order of the elements.

### CONCLUSION

It is obvious that several of the assumptions in this paper will need further investigation. Everything said would best be taken as tentative. But a lot of the facts in linguistic description would begin to make sense if there is an explanation or explanatory basis for them; this is what the target structures hypothesis is all about. Regardless of how one formulates the deletion rules already mentioned -- whether as separate deletion rules, or block deletion process -- the nature of their

operations, at the level at which they apply, and the final outcome of such operations, which is the totally opaque gerundive structures, will all begin to make sense in terms of target structure hypothesis. Of course, much cross-linguistic investigation will still have to be done to ascertain the validity of the hypothesis in general, and the types of structures likely to participate. It is interesting that the two structures involved in the Yoruba data are both embedding structures.

The overall picture we get of the Yoruba phenomena is that a single bound morpheme represents three structures on the surface:



If this hypothesis is correct, then the present theory will have to be modified to accommodate it.

#### NOTES

Professors Green, Morgan and Stahlke, have all read the term paper version of this paper. Their comments have been very useful in this final draft. I must hasten to say however that they are in no way responsible for all the errors of judgement, or interpretation, that this paper may contain.

On the notational convention, the orthography of standard Yoruba has been adopted. The following nasal vowels - on, in, and un are the I.P.A. [ɔ̃, ɪ̃, ʊ̃] respectively. Similarly, the vowels o and e are [ɔ, ɛ]. The I.P.A. [kp], the non-voiced labio-velar consonant, is always p in the orthography. It too is adopted since it has no other variant.

<sup>1</sup> I owe this clarification to Professor Stahlke.

<sup>2</sup> This observation on the functions of the complementizers also came out of discussion with Prof. Stahlke.

<sup>3</sup> Originally, both (6e) and (6f) were thought to be derived by a movement rule which removes the 'meat' from the embedded object position and makes it the direct object of the main sentence; there is no evidence for movement. Rather the object is copied while a pronoun copy is left behind in its place.

<sup>4</sup> I owe the observation that gerundive reduplication might be a global process, to Prof. Green. If global, then the rule would have access to the information on the absence or presence of the aspect markers.

<sup>4a</sup> The approaches were discussed in the class seminars on 'target structures' in the Fall of 1973.

<sup>5</sup>The notions of marked and unmarked orders seem useful here since at the underlying structure the normal order for a verb and its object is VERB + OBJECT NP. This order is now changed to become marked when at the surface we have OBJECT + GERUND.

<sup>6</sup>This sequence - NOUN + GERUNDIVE FORM - suggests that the supposed target structures could be linear as well as structural.

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DARI RELATIVE CLAUSES

John R. Houston, Jr.

This paper will concern itself with aspects of relative clauses in Dari, the Farsi spoken in and around Kabul, Afghanistan. Points to be considered are: the status of what has been generally considered the invariant relative clause marker, deletion and pronominalization in relative clauses, the raising of information from a lower to a higher sentence, extraposition of relative clauses and the relationship of extraposition to other rules in the relativization process.

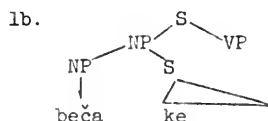
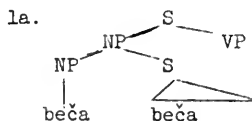
Relative clauses in Dari take the form NP ke S. That is, the relative clause follows the noun it modifies, has an invariant marker at the beginning of the clause and the clause itself takes the form of S. Dari is an SOV language.

One essential part of each relative clause is the morpheme ke. The ke has been considered by some grammarians (Lambton, etc.) to be a relative pronoun. This view is inaccurate and I will demonstrate that ke is not a relative pronoun but is rather an introductory particle that marks the following clause as being a constituent rather than the matrix S.

The initial hypothesis proposing ke as a relative pronoun had some apparent support from sentences like:

1. beča ey ke kitəborə mexone injes  
(boy art books OM reads is here)<sup>1</sup>  
"The boy who reads books is here."

where it appears that a structure like 1a. becomes a structure like 1b.



The lower instance of beča would become ke either by deleting the lower beča and substituting ke in its place or by the lower beča becoming ke

under identity with the higher beča.

However, serious trouble for this analysis arises with sentences like:

2. d>xtar ey ke m>ri ura mišnose amidesti raft  
(girl art Mary she OM know 3 just left 3)<sup>1</sup>

"The girl that Mary knows just left."

In this sentence there is an occurrence of a pronominal object in the relative clause. This indicates that there is no deletion going on between the two coreferent NPs in this sentence. In this case the lower NP is pronominalized.

Further evidence comes from the possessive construction in relative clauses.

3. m>ard ey ke kit>b ey - iš injes ali æs  
(man art book art his be 3 here Ali be 3)

"The man whose book is here is Ali."

The -iš in this sentence is a suffixal pronoun which in Dari, and other dialects of Farsi, can be used in the place of non-subject independent pronouns. Thus:

4. ma ura didum  
(I he OM saw 1)

"I saw him."

and

5. ma didum-iš  
(I saw 1 him/her/it)

"I saw him."

are equally good Dari. Both translate as "I saw him." The sentence:

6. mælem ey d>xtar aliæs  
(teacher art girl Ali be 3)

"The girl's teacher is Ali."

can have d>xtar (girl) pronominalized and appear as:



7. mələm ey-iş ali əs  
(teacher art her Ali be 3)

"Her teacher is Ali."

Thus sentence 3 provides an example of pronominalization and suppletion to -iş rather than movement of the lower coreferent NP and replacement of the NP with ke.

Evidence from Pied Piping, or rather the lack of Pied Piping, also shows that ke is not a relative pronoun.

8. dɔxtar ey ke ma kitəbə bare-iş dodum amidesti raft  
(girl art I book OM to her gave 1 just left 3)

"The girl that I gave a book to just left."

Again the -iş shows up indicating that the lower coreferent NP has not been moved to the front of the relative clause and replaced by ke but rather has maintained its original position, has been pronominalized and then suppleted by -iş.

ke cannot be a relative pronoun because the lower coreferent NP is not moved to the beginning of the relative clause, which is the position ke must occupy. The lower NP is pronominalized as in 2 and 3 or is deleted by a rule which I will discuss later in the paper.

Further evidence that ke is not a relative pronoun is that it is not inflected for number, cannot take a case marker and cannot be the object of a preposition, whereas the pronoun can.

9. mərd ey ke ma ura mişnosum amidesti raft  
(man art I he OM know 1 just left 3)

"The man that I know just left."

In this sentence the pronoun has the object marker -ra on it. Now consider the same sentence with the object marker on the ke and on the pronoun.

- 10.\* mərd ey kera ma ura mişnonum amidesti raft  
(man art OM I he OM know 1 just left 3)

And now with the object marker on the ke and the pronoun deleted.

11.\* mærd ey kera ma mišnosum amidesti raft

(man art OM I know 1 just left 3)

Both sentences are ungrammatical because ke cannot take an object marker. The following sentences show that ke cannot take a plural marker while pronouns can:

12. mærd ey ke ma un>ra mišnosum amidesti raftan

(Men art I they OM know 1 just left 3)

"The men that I know just left."

My informant was unable to conceive what a plural form of ke might be.

Next consider the case where the pronoun is the object of a preposition:

13. beča ey ke ma kit>ba bare-iš dodum by dar ey ma. əs

(boy art I book OM to him gave 1 brother art my be 3)

"The boy that I gave the book to is my brother."

Any attempt to make ke the object of the preposition results in ungrammaticality.

14.\* beča ey bare ke ma kit>ba dodum by>dar ey ma əs

(boy art to I book OM gave 1 brother art my be 3)

The interrogative pronoun, which bears a phonological resemblance to ke, behaves quite differently from ke. While not inflected for number as the personal pronoun is, the interrogative pronoun can take the object marker and be the object of a preposition.

15. ki ba bazar raft

(who to bazaar went 3)

"Who went to the bazaar?"

16. ali ki ra did

(Ali who OM saw 3)

"Who did Ali see?"

17. məri kitsəbə tə ki död ?

(Mary book OM to who gave 3)

"Who did Mary give the book to?"

In conclusion, ke cannot be a relative pronoun since it does not replace the coreferent NP in relative clauses, the coreferent NP is not fronted to the beginning of the clause, whereas ke is always clause initial, it cannot be inflected for number as pronouns can and it cannot take the object marker or be the object of prepositions as the pronoun and the interrogative pronoun can.

Since ke cannot function as a pronoun, some thought must be given as to what ke really is. Notice that there are other instances of ke in Dari that are not relative clauses:

18. padar ey ma aynaek mepoše ke čišme-iš xarab ne sə

(father art my glasses wear 3 eyes his hurt not be 3)

"My father wears glasses so that his eyes won't be hurt."

19. ali guft ke əbib zanexoda lat mekad

(Ali said 3 Habib wife OM beat 3)

"Ali said that Habib was beating his wife."

20. unə faisala kadan ke bəru

(they decided go)

"They decided to go."

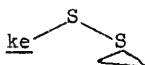
There are a number of features that the ke of the relative clause and the ke of the complement system share. Both precede S. Both mark the S that they precede as being a constituent rather than a matrix S. Non-subject complements follow the verb whereas the typical form of the language is SOV. Relative clauses, under conditions that will be dealt with later, can be extraposed to the end of the sentence. In fact, the tendency is to extrapose relatives whenever possible. The tendency to extrapose is not surprising when one considers the complexity of processing a sentence of the form:

Subject + Complement/Relative Clause + Verb

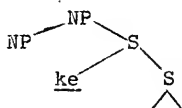
compared with the simpler extraposed form:

Subject + Verb + Complement/Relative Clause

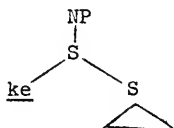
The question arises as to whether one ke should be considered a marker of relative clauses and another ke, homophonous to the first, should be the marker of complements. Treating them separately seems redundant since both instances of ke could easily be collapsed by treating any constituent S as having the form:



Under this analysis, relative clauses would be:



and complements would be:



In Dari relative clauses, when the coreferent NP in the lower S is in subject position, it must be deleted after subject-verb agreement. Dari verbs are inflected for person and number. Person will be denoted by 1,2 and 3 for first, second and third person. Pronominalization or failure to delete results in ungrammaticality.

21. dɔxtar ey ke diriši mepoše ~~marde~~ ra did  
 (girl art dress wear 3 man OM saw 3)  
 "The girl who is wearing the dress saw the man."

Failure to delete the coreferent NP results in:

- 22.\* dɔxtar ey ke dɔxtar diriši mepoše mærdə ra did  
 (girl art girl dress wear 3 man OM saw 3)

Pronominalization results in the equally bad:

- 23.\* dɔxtar ey ke u diriši mepoše mærdə ra did  
 (girl art she dress wear 3 man OM saw 3)

The coreferent NP in the matrix S, regardless of its case, must delete the lower NP that is in subject position. In the following sentence the matrix NP is the object of a preposition and it still deletes the lower NP.

24. ma kitɔba ba beča ey ke ʋazal mexone dodum  
 (I book OM to boy art songs sing 3 gave 1)

"I gave the book to the boy who sings songs."

Deletion must also apply when the matrix NP is an object of the matrix S and the constituent NP is a subject.

25. ma beča ey ra ke ʋazal mexone mišnosum  
 (I boy art OM songs sing 3 know 1)  
 "I know the boy who sings songs."

Lack of deletion gives:

- 26.\* ma beča ey ra ke beča ʋazal mexone mišnosum  
 (I boy art OM boy songs sing 3 know 1)

Pronominalization gives:

- 27.\* ma beča ey ra ke u ʋazal mexone mišnosum  
 (I boy art OM he songs sing 3 know 1)

This rule of deleting lower subjects, which I have cunningly named Lower Subject Deletion (LSD), also applies over a variable as in the following sentence:

28. beča ey ke jon fekr mekone ke mōri ra mišnose besyar mexone  
 (boy art John think 3 Mary OM know 3 a lot study 3)  
 "The boy that John thinks knows Mary studies a lot."

As in the case where a variable is not involved, pronominalization or failure to delete the subject NP in the lower S results in ungrammaticality. Failure to delete gives:

- 29.\* beča ey ke jon fekr mekone ke beča mōri ra mišnose besyar mexone  
 (boy art John thinks 3 boy Mary OM know 3 a lot study 3)  
 Pronominalization of the lower subject gives:

- 30.\* beča ey ke jon fekr mekone ke u mōri ra mišnose besyar mexone  
 (boy art John think 3 he Mary OM know 3 a lot study 3)  
 Along with LSD, which applies only to constituent subjects, there exists another deletion rule in Dari which applies to constituent non-subject NPs. This rule involves the deletion of the constituent non-subject and the subsequent attachment of the case marker or preposition of the constituent non-subject to the position of the matrix subject NP. For this transformation to take place the matrix NP must be subject, and thus not marked for case nor the object of a preposition. This rule cannot apply across a variable. Across a variable only pronominalization can take place.

Consider the following sentence:

31. beča ey ke ma ura mišnosum besyar mexone  
 (boy art I he OM know 1 a lot study 3)  
 "The boy that I know studies a lot."

With Lower Object Deletion (LOD) and the raising up of the object marker, which I will call Case Float (CF), the sentence becomes:

32. beča ey ra ke ma mišnosum besyar mexone  
 (boy art OM I know 1 a lot study 3)

Once LOD takes place, the case marker cannot remain in the constituent S but must be moved out. Failure to move it out gives:

33.\* beča ey ke ma ra mišnosum besyar mexone

(boy art I OM know 1 a lot study 3)

Nor can the case marker be moved out of the constituent S leaving behind the pronoun:

34.\* beča ey ra ke ma u mišnosum besyar mexone

(boy art OM I he know 1 a lot study 3)

Nor can the case marker be copied onto the matrix NP and also be left in the constituent S:

35.\* beča ey ra ke ma ura mišnosum besyar mexone

(boy art OM I he OM know 1 a lot study 3)

As mentioned previously, LOD and CF can apply only when the matrix NP is subject. Otherwise, the constituent NP must undergo pronominalization. In the following sentence the matrix NP is an object and so the lower NP must be pronominalized.

36. jon beča ey ra ke mōri kitoba bare-iš dod did

(John boy art OM Mary book OM to him gave 3 saw 3)

"John saw the boy that Mary gave a book to."

LOD and CF apply also in cases where the lower coreferential NP is the object of a preposition. In such cases the preposition is lifted out of the lower S and adjoined to the matrix NP, provided that the matrix NP is subject and thus unmarked.

In the following sentence the lower NP is the object of a preposition and the matrix NP is subject.

37. beča ey ke mōri kitoba bare-iš dod injes<sup>2</sup>

(boy art Mary book OM to him gave 3 be here 3)

"The boy that Mary gave a book to is here."

With LOD and CF this becomes:

38. ba beča ey ke mōri kitoba dod injes

(to boy art Mary book OM gave 3 be here 3)

The application of these rules to sentences where the higher NP is not subject results in ungrammatical sentences. If LOD and CF are applied to the sentence:

39. jɔn beča ey ra ke mɔri kitɔba bare-iš dod did  
 (John boy art OM Mary book OM to him gave 3 saw 3)  
 "John saw the boy that Mary gave a book to."  
 the results would be:

- 40.\* jɔn ba beča ey ra ke mɔri kitɔba dod did  
 (John to boy art OM Mary book OM gave 3 saw 3)  
 The sentence is ungrammatical because the matrix NP is an object and thus does not meet the criterion for CF. The same restrictions hold for a sentence like:

41. jɔn kitɔba ba beča ey ke mɔri ura mišnose dod  
 (John book OM to boy art Mary he OM know 3 gave 3)  
 "John gave the book to the boy that Mary knows."  
 The higher NP is the object of a preposition and thus not eligible for LOD and CF. For this sentence LOD and CF give:

- 42.\* jɔn kitɔba ba beča ey ra ke mɔri mišnose dod  
 (John book OM to boy art OM Mary know 3 gave 3)  
 LOD and CF do not apply over a variable and thus sentences like the following cannot undergo the process.

43. beča ey ke jɔn fekr mekone ke mɔri ura did raft  
 (boy art John think 3 Mary he OM saw 3 left 3)  
 "The boy that John thinks Mary saw left."  
 With LOD and CF the result is:

- 44.\* beča ey ra ke jɔn fekr mekone ke mɔri did raft  
 (boy art OM John think 3 Mary saw 3 left 3)  
 There is another instance of LOD and a possible case of vacuous



CF as the sentence:

45. jon beča ey ra ke mōri ura did mišnose

(John boy art OM Mary he OM saw 3 know 3)

"John knows the boy that Mary saw."

which can be rendered with the lower coreferent NP optionally deleted.

46. jon beča ey ra ke mōri dil mišnose

(John boy art OM Mary saw 3 know 3)

This sentence is a counterexample to the conditions stated on LOD. The primary condition was that the matrix NP had to be subject, that is, unmarked for case and not the object of a pronoun. The deletion of a lower object would free the case marker or preposition to move to the position of the matrix NP. Notice that in sentences 40 and 42 the sentences were ungrammatical because the matrix NP had both a case marker and a preposition, an impermissible combination. However, in this case where the matrix NP is object and the lower NP is also object, the end result would not be that the matrix NP would wind up with a disallowed series of object markers and prepositions. At worst, the matrix NP would have 2 identical case markers which could then be easily collapsed into one. That is one possible explanation. Another is that the lower NP is deleted in its entirety under exact identity with the higher NP. This rule would handle sentences like 46 but it would be a different rule from LOD since LOD leaves the case marker or preposition behind. Since LOD has to be used anyhow, it seems that it is more natural to say that in sentences like 46 Lower Object Deletion is applying followed by Case Float and there is another rule that reduces double object markers to single object markers. However, this does still not explain how Lower Object Deletion can apply in this case since in previous description it was required that the matrix NP be subject and in sentence 46 it is object.

It turns out that there are two separate rules evidenced here. One is Lower Object deletion and the other is what I will call Identical Object Deletion. The crucial examples that demonstrate the difference

between these rules show up in extraposition. Lower Object Deletion requires that the matrix NP be subject or unmarked for case. The lower N is then deleted and the case marker or preposition is attached to the matrix NP. A sentence that has undergone this process cannot extrapose the relative clause to the end of the sentence. Consider the following:

- 45a. dɔxtar ey ke ʃɔn miʃnose inja əs  
 (girl art John know 3 here be 3)  
 "The girl that John knows is here."

Lower Object Deletion and Case Float can apply yielding:

- 45b. dɔxtar ey ra ke ʃɔn miʃnose inja əs  
 (girl art OM John know 3 here be 3)

The relative clause in this sentence cannot be extraposed.

- 45c. \*dɔxtar ey ra inja əs ke ʃɔn miʃnose  
 (girl art OM here be 3 John know 3)

Now consider a sentence where Identical Object Deletion can take place. The conditions for this type of deletion are that both the matrix and constituent NP be objects. This deletion does not apply when the matrix and constituent NP are objects of identical prepositions. They must be direct objects.

- 46a. ʃɔn beʃa ey ra ke mɔri ura miʃnose did  
 (John boy art OM Mary he OM know 3 saw 3)  
 "John saw the boy that Mary knows."

Using the rule of Identical Object Deletion we get:

- 46b. ʃɔn beʃa ey ra ke mɔri miʃnose did  
 (John boy art OM Mary know 3 saw 3)

Unlike the sentences with Lower Object Deletion, those with Identical Object Deletion can extrapose the relative clause.

46c. jon beča ey ra did ke mōri mišnose

(John boy art OM saw 3 Mary know 3)

I have no clear intuitions as to why Identical Object Deletion does not apply to identical objects of prepositions, but as the following sentences show, this is the case.

47. jon kitob a ba doxtar ey ke ma diriši bare-iš dodum dod

(John book OM to girl art I dress to her gavé 1 gave 3)

"John gave a book to the girl that I gave a dress to."

Deleting the lower object of a preposition in its entirety results in:

48.\* jon kitob a ba doxtar ey ke ma diriši dodum dod

(John book OM to girl art I dress gavel gave 3)

Thus far, in accounting for how lower object markers and prepositions surface on higher NPs, I have referred to LOD (Lower Object Deletion) and CF (Case Float). I should point out that there was another possible way to account for this phenomenon. It seemed as logical to say that the lower object NP was simply copied into the higher NP position. The lower NP could then be deleted under identity with the higher one. The evidence that this is not the case comes from the fact that restrictive relative clauses must have an article postposition attached to the matrix NP. If the article is omitted, the sentence is ungrammatical. Thus:

49. doxtar ey ke mōri ra mišnose inja æs

(girl art Mary OM know 3 here be 3)

"The girl that knows Mary is here."

is ungrammatical if the article is omitted:

50.\* doxtar ke mōri ra mišnose inja æs

(girl Mary OM know 3 here be 3)

Likewise, the following sentence is ungrammatical because the article postposition is attached to an NP without a modifier:

51.\* ma dɔxtar ey ra didum

(I girl art OM saw 1)

"I saw the girl."

Only those NPs that are modified by something outside the matrix S, such as reduced and non-reduced restrictive relatives and genitives, can have the article postposition.

There appears, then, to be a problem with the copying analysis that would take a lower NP and put it in the position of the higher NP. If the higher NP dominates the article node, which would have ey in it, the lower NP, in taking the place of the higher one, would not have ey in it and thus result in sentences like:

52.\* dɔxtar ke mɔri ra miʃnose inja æs

(girl Mary OM know 3 here be 3)

"The girl that knows Mary is here."

If one espoused the notion that the head of a relative clause had an unfilled node N and that this node N was filled by copying the contents of the node N in the constituent S, there would still be problems. Consider the sentence:

53. ma kitoba ba beča ey ke mɔri ura miʃnose

(I book OM to boy art Mary he OM know 3)

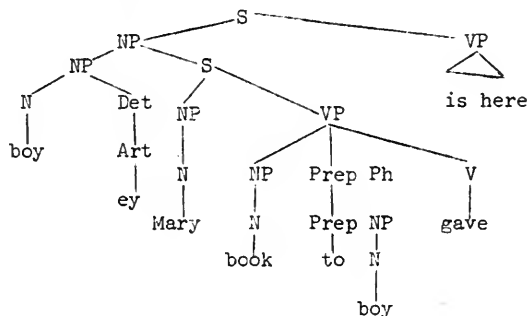
"I gave the book to the boy that Mary knows."

This sentence could easily be handled by saying that beča (boy) was copied out of the constituent S and then the beča in the constituent was pronominalized under identity with beča in the matrix S. This seems as acceptable an analysis as the one I have offered. I have discovered nothing that would militate against such an analysis. I have, however, found what I consider very strong evidence that the entire NP or a node dominating it cannot be copied into the matrix S.

Consider the sentence:

54. beča ey ke mōri kitōb a bare-iš dod inja æs  
 (boy art Mary book OM to him gave 3 here be 3)  
 "The boy that Mary gave a book to is here."

If we can assume that a remote structure of the sentence is:



then it would be impossible to arrive at the grammatical sentence:

55. ba beča ey ke mōri kitōba bare-iš dod inja æs  
 (to boy art Mary book OM to him gave 3 here be 3)  
 "The boy that Mary gave a book to is here."

if what is involved is the copying of the entire Prepositional Phrase from the constituent sentence. The reason for the ungrammaticality of the following sentence:

- 56.\* ba beča ke mōri kitōba bare-iš dod inja æs  
 (to boy Mary book OM to him gave 3 here be 3)

is that the article postposition is absent. If the Prepositional Phrase were copied in its entirety from the constituent S, there would be no way to acquire the required ey after beča (boy).

It was because of the inherent difficulties of such an approach that I opted for the LOD (Lower Object Deletion) and CF (Case Float) analysis.

Relative clauses may be extraposed to the end of the matrix sentence provided they meet certain criteria. The first of these is that the relative clause must be restrictive. Restrictive relative clauses are differentiated from non-restrictives, on the surface, by the presence of an article postposition attached to the matrix N. Another common way of marking restrictives is to place a definite determiner before the matrix NP. Non-restrictives have neither of these markers. In this paper I will confine myself to the type that have the article postposition.

The following sentence with a restrictive relative clause can have that clause extraposed to the end of the sentence.

57. jawano ey ke sardo germe zendigira na didan  
 (youths art cold hot life OM not saw 3)  
 qazawat ey drost kada ne metonan  
 (judgement art sound do not can 3)  
 "Youths who have not experienced the hot and cold of life  
 don't have sound judgement."  
 extraposition gives:

58. jawano ey qazawat ey drost kada ne metonan  
 (youths art judgement art sound do not can 3)  
 ke sardo germe zendigira na didan  
 ( cold hot life OM not saw 3)  
 Contrast the preceding sentence having a restrictive relative clause with the following one with a non-restrictive clause.

59. jawano ke sardo germe zendigira na didan  
 (youths cold hot life OM not saw 3)  
 qazawat ey drost kada ne metonan  
 (Judgement art sound do not can 3)  
 "Youths, who have not experienced the hot and cold of life,  
 don't have sound judgement."

In its extraposed form it becomes:

- 60.\* jawano qazawat ey drost kada ne metonan  
 (youths judgement art sound do not can 3)  
 ke sardo germe zendigira na didan  
 ( cold hot life OM not saw 3)

Extraposition of the non-restrictive relative clause renders the sentence ungrammatical. Another example of the restrictive/non-restrictive distinction is the following set of sentences. The restrictive relative clause in:

61. zano ey ke del ey nozuk doran ba gudoi garo paysar meytan  
 (women art hearts art soft have 3 to beggars money give 3)  
 "Women who have soft hearts give money to beggars."

can be extraposed to give:

62. zano ey ba gudoi garo paysar meytan ke del ey nozuk doran  
 (women art to beggars money give 3 hearts art soft have 3)

Contrast this with the following non-restrictive sentence in its unextraposed form:

63. zano ke del ey nozuk doran ba gudoi garo paysar meytan  
 (women hearts art soft have 3 to beggars money give 3)  
 "Women, who have soft hearts, give money to beggars."

and then in its extraposed form:

- 64.\* zano ba gudoi garo paysar meytan ke del ey nozuk doran  
 (women to beggars money give 3 hearts art soft have 3)

The extraposed non-restrictive relative clause results in an ungrammatical sentence.

When a restrictive relative clause is extraposed, the article postposition on the matrix N marking that N as the referent of the relative clause insures that the relative clause will unambiguously refer back to its original head. The sentence:

65. beča ey ke besyar mexone kitoba ba dɔxtar dod

(boy art a lot study 3 book OM to girl gave 3)

"The boy who studies a lot gave the book to the girl."

in its extraposed form:

66. beča ey kitoba ba dɔxtar dod ke besyar mexone

(boy art book OM to girl gave 3 a lot study 3)

is unambiguous. The relative clause refers to beča (boy) because beča has the article postposition attached to it. The clause could not refer to dɔxtar (girl) because dɔxtar does not have the article after it. The same holds true for the sentence:

67. dɔxtar ey ke homel əs zan e did

(girl art pregnant is woman OM saw 3)

"The girl who is pregnant saw the woman."

which, with the relative clause extraposed, is:

68. dɔxtar ey zan e did ke homel əs

(girl art woman OM saw 3 pregnant is)

and the relative clause ke homel əs (who is pregnant) refers unambiguously to dɔxtar (girl) because it has the article postposition.

The function of the article postposition, which may well turn out to be some sort of subordinator, appears to be to signal that the noun before it is modified by whatever follows it at a given stage in the derivation. Some indication that this may be the case is provided by the possessive construction.

69. kitob ey mori

(book art Mary)

"Mary's book"

70. dɔxtar ey ali

(girl art Ali)

"Ali's daughter"



71. poy ey čawki  
 (leg art chair)  
 "the leg of the chair"

All of these phrases are ungrammatical without the article. The article is a necessary link between the nouns. Further evidence comes from what appears to be reduced relative clauses:

72. sutur ey ke səfed əs  
 (camel art white is)  
 "The camel that is white"

This can also be rendered as:

73. sutur ey səfed  
 (camel art white)  
 "the white camel"

Other examples are:

74. moter ey ke kalon əs  
 (car art big is)  
 "the car that is big"

75. moter ey kalon  
 (car art big)  
 "the big car"

76. mærd ey ke kočək əs  
 (man art small is)  
 "the man who is small"

77. mærd ey kočək  
 (man art small)  
 "the small man"

What is happening here is somewhat like Whiz deletion in English. The ke and the verb ə (be) are deleted. Notice that this deletion applies only to restrictive relative clauses. My informant found any attempt to delete the same material from non-restrictive clauses unacceptable. It may be that all constructions using ey are underlyingly

restrictive relatives, but I have not yet pursued this possibility.

The second condition on relative clause extraposition is that the matrix NP cannot be inflected in any way by CF. That is, if the matrix NP is marked for case or is the object of a preposition it must have acquired that marking within the confines of the matrix S and not by any interaction with a constituent S.

Consider sentences where the matrix NP has acquired a marking within the matrix S.

78. jon beča ey ra ke mōri kitōba bare-iš dod did

(John boy art OM Mary book OM to him gave 3 saw 3)

"John saw the boy that Mary gave a book to."

beča (boy) has an object marker because it is the object of the matrix verb did (saw). The relative clause can be extraposed to give:

79. jon beča ey ra did ke mōri kitōba bare-iš dod

(John boy art OM saw 3 Mary book OM to him gave 3)

The same holds true for objects of prepositions in the matrix S.

80. jon ba beča ey ke mōri ura did kitōba dod

(John to boy art Mary he OM saw 3 book OM gave 3)

"John gave a book to the boy that Mary saw."

The relative clause can be extraposed giving:

81. jon ba beča ey kitōba dod ke mōri ura did

(John to boy art book OM gave 3 Mary he OM saw 3)

The above sets of sentences are grammatical in their extraposed forms. Now consider cases where CF occurs. The sentence:

82. beča ey ke mōri kitōba bare-iš dod logar raft

(boy art Mary book OM to him gave 3 Logar went 3)

"The boy that Mary gave a book to went to Logar."

can undergo LOD and CF and become:

83. ba beča ey ke mōri kitōba dod logar raft  
 (to boy art Mary book OM gave 3 Logar went 3)

Extrapolation after CF gives:

84. \*ba beča ey logar raft ke mōri kitōba dod  
 (to boy art Logar went 3 Mary book OM gave 3)

Extrapolation after CF results in ungrammaticality. The above sentence had acquired a preposition through CF. Now consider one that acquires an object marker through CF.

85. beča ey ke ma ura mišnosum besyar mexone  
 (boy art I he OM know 1 a lot study 3)

"The boy who I know studies a lot."

CF gives:

86. beča ey ra ke ma mišnosum besyar mexone  
 (boy art OM I know 1 a lot study 3)

Extrapolation after CF produces:

87. \*beča ey ra besyar mexone ke ma mišnosum  
 (boy art OM a lot study 3 I know 1)

There appear to be three ways to account for this phenomenon:

1. Rule Ordering

The order in which the rules apply is transparent. All that is needed is an ordering of the rules such that Extrapolation precedes CF. The trouble with this analysis is that it is more of an engineering solution than anything else. It conveys practically no information.

2. Surface Structure Constraint

There may be a surface structure constraint to the effect that a verb must have an unmarked NP for its subject when there is no intervening S between the verb and its subject. This would account for the grammaticality of:

88. doxtar ey ra ke ma mišnosum inja æs  
 (girl art OM I know 1 here be 3)  
 "The girl that I know is here."

and the ungrammaticality of:

89. \*doxtar ey ra inja æs ke ma mišnosum  
 (girl art OM here be 3 I know 1)

This would be the reason why extraposition cannot apply after Case Float. A constraint of this type could be construed to be trans-derivational in motivation since it appears to rely on the ungrammaticality of sentences like:

90. \*doxtar ra raft  
 (girl OM left 3)

to account for the ungrammaticality of sentences like:

91. \*doxtar ey ra raft ke ma mišnosum  
 (girl art OM left 3 I know 1)

If appeal to outside sources is required it seems more direct to propose a third approach.

### 3. Global Rule

A global rule to the effect that no S can be extraposed if any element has been lifted from it, as opposed to deleted from it, accounts for the data. Appeal is made only to the derivational history of the sentence without the need for outside information about the language. This approach is very direct and gives a considerable amount of information. For these reasons I feel it is the most reasonable solution.

The third condition on extraposition of relative clauses is that the clause with the coreferential NP must be a sister to the NP it modifies. If the clause is not immediately dominated by the same NP that dominates the modified NP, only Lower Subject Deletion or pronominalization may occur. There can be no Lower Object Deletion, Case Float or extraposition.

Consider the following sentence where there is an intervening S between the matrix and coreferent NPs:

92. beča ey ke jon fekr mekone ke mōri ura mišnose besyar mexone  
 (boy art John think 3 Mary he OM know 3 a lot study 3)  
 "The boy that John thinks Mary knows studies a lot."

Here, where the lower NP has an object marker, CF gives:

93. \*beča ey ra ke jon fekr mekone ke mōri mišnose besyar mexone  
 (boy art OM John think 3 Mary know 3 a lot study 3)

Extrapolation of sentence 92 gives:

94. \*beča ey [ke jon fekr mekone] [besyar mexone] ke mōri ura mišnose  
 (boy art John thinks a lot study 3 Mary he OM know 3)

The same constraints hold when the lower NP is the object of a preposition.

95. beča ey ke jon fekr mekone ke mōri kitoba bare-iš dod raft  
 (boy art John think 3 Mary book OM to him gave 3 left 3)  
 "The boy that John thinks Mary gave a book to left."

With CF the sentence is:

96. \*ba beča ey ke jon fekr mekone ke mōri kitoba dod raft  
 (to boy art John think 3 Mary book OM gave 3 left 3)

With extrapolation applied to sentence 95 the result is:

97. \*beča ey raft ke jon fekr mekone ke mōri kitoba bare-iš dod  
 (boy art left 3 John think 3 Mary book OM to him gave 3)

The evidence from the ungrammaticality of sentences 93, 94, 96 and 97 show that Case Float and extrapolation are upward bounded. Neither Case Float, a leftward movement rule, not extrapolation, a rightward movement rule, can move any element out of the immediately dominating S.

The fourth condition on extrapolation comes from an analysis of the direct and indirect object in Dari. The usual ordering of the

elements on the surface is direct object followed by indirect object.

98. ma kitob a ba ali dodum  
 (I book OM to Ali gave 1)  
 "I gave the book to Ali."

When either the direct or indirect object has a relative clause, the objects can be flipped and the relative clause can be extraposed from either position provided it meets the preceding criteria for extraposition. From the sentence:

99. ma kitob ey ra ke ma xaridum ba ali dodum  
 (I book art OM I bought 1 to Ali gave 1)  
 "I gave the book that I bought to Ali."

The objects can be flipped giving:

100. ma ba ali kitob ey ra ke ma xaridum dodum  
 (I to Ali book art OM I bought 1 gave 1)

The relative clause can be extraposed from the normal word order:

101. ma kitob ey ra ba ali dodum ke ma xaridum  
 (I book art OM to Ali gave 1 I bought 1)  
 or from the flipped word order:

102. ma ba ali kitob ey ra dodum ke ma xaridum  
 (I to Ali book art OM gave 1 I bought 1)

It should be noted that the extraposed versions are considered more comfortable to native speakers. There may be a tendency to avoid having contiguous verbs at the end of the sentence as in 100 or perhaps a tendency to avoid sandwiching sizeable chunks of verbiage between the subject and the verb.

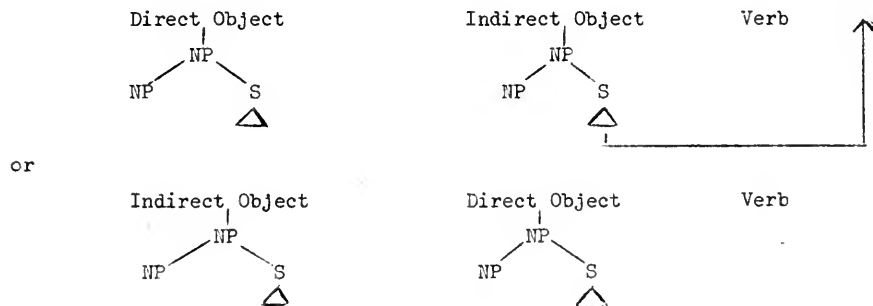
Complications arise when both the direct and indirect objects have relative clauses. In that case the direct and indirect objects can still be flipped freely. Extraposition becomes constrained to the extent that a flipped direct object, which would now be closer to the

verb, may extrapose its relative clause but the sentence becomes much less acceptable than if it did not extrapose. It is still grammatical but its acceptability rating has greatly lowered.

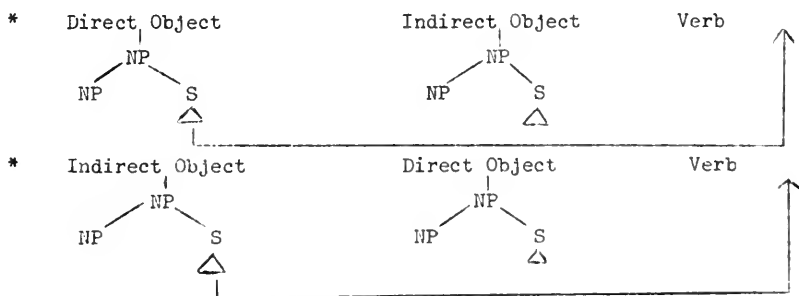
Extrapolating one relative clause over another results in ungrammaticality. Thus, in the normal order of direct object followed by indirect object, the relative clause of the direct object cannot be extrapolated over the indirect object relative clause. It is not the case that the direct object relative clause cannot be extrapolated over an indirect object. Rather, it cannot be extrapolated over another clause.

The same holds for when the direct and indirect objects both have relative clauses and they have been flipped. The resulting order is then indirect object and a relative clause followed by direct object and a relative clause. In this case the relative clause of the indirect object cannot be extrapolated over the direct object relative clause.

The preferred order is:



The following are ungrammatical:



Consider the following sentence with the usual order of direct followed by indirect object, each with a relative clause:

103. ma kitob ey ra ke ma xaridum ba beča ey ke mōri ra mišnose dodum  
 (I book art OM I bought 1 to boy art Mary OM know 3 gave 1)  
 "I gave the book that I bought to the boy that knows Mary."

Extraposition of the indirect object relative clause gives:

104. ma kitob ey ra ke ma xaridum by beča ey dodum ke mōri ra mišnose  
 (I book art OM I bought 1 to boy art gave 1 Mary OM know 3)  
 Extraposition of the direct object relative clause gives:

- 105.\*ma kitob ey ra ba beča ey ke mōri ra mišnose dodum ke ma xaridum  
 (I book art OM to boy art Mary OM know 3 gave 1 I bought 1)  
 Flipping the direct and indirect objects in sentence 104 gives:

106. ma ba beča ey ke mōri ra mišnose kitob ey ra ke ma xaridum dodum  
 (I to boy art Mary OM know 3 book art OM I bought 1 gave 1)  
 Extraposing the flipped direct object relative clause gives:

107. ?ma ba beča ey ke mōri ra mišnose kitob ey ra dodum ke ma xaridum  
 (I to boy art Mary OM know 3 book art OM gave 1 I bought 1)  
 Extraposing the flipped indirect object clause over the direct object clause gives:

- 108.\*ma ba beča ey kitob ey ra ke ma xaridum dodum ke mōri ra misnose  
 (I to boy art book art OM I bought 1 gave 1 Mary OM know 3)

#### FOOTNOTES

<sup>1</sup>OM will be used to designate object marker.

<sup>1'</sup>The numbers after the verbs indicate first, second or third person.

<sup>2</sup>For the purposes of this paper bare "to" and ba "to" are interchangeable.



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ADJECTIVE FLIPPING AND THE NOTION OF TARGET STRUCTURE

David E. Johnson

0. Introduction

The basic aim of this study is to characterize the conditions which determine the applicability of the rule or rules of Adjective Flipping (alias Adjective Preposing, Adjective Shift). A global derivational constraint is proposed that will block, for example, the derivation of the (A) sentences, but not the (B) sentences:

- (1) A.1. \*John is a proud father of his job.
- 2. \*John is an angry man at his work.
- 3. \*John is a good swimmer at basketball.
- 4. \*John was an eager man to leave
- B.1. John is a proud father of twins.
- 2. John is an angry man at work. (locative sense)
- 3. John is a good coach in a pinch.
- 4. John is a nicer person than Max.
- 5. Rex is too eager a dog to learn tricks.
- 6. Max was a wise man to leave.

This inquiry is a preliminary one, since the problems connected with Adjective Flipping (AF) quickly reach major proportions and would require an entire monograph for adequate treatment. The focus of this paper will be almost entirely restricted to the flipping of adjectives, rather than verbs (participles), which would require a separate study.

The existence of AF is being taken for granted, although I think that sentences such as (B4, 5, 6) could easily form a strong basis for an argument substantiating its existence. Along with AF, it is assumed that a rule of relative clause reduction exists in some form. This rule relates such forms as (2a) and (2b):

- (2)a. John was a man who was eager to leave.
- b. John was a man eager to leave.

In the past, this rule has gone by several names: Wh-be Deletion, Wh-Del, Whiz Deletion. The last, Whiz Deletion, will be adopted here.

# 1. Earlier Observations

As a simple example of the problem under discussion, compare (3a) and (3b):

(3)a. John is a proud father of twins.

b. \*John is a proud father of his job.

The surface pattern of both (3a) and (3b) has the form:

(4) NP - be - Det - Adj - N - PP

yet only (3a) is grammatical. If we consider the meaning of (3a) and contrast it with that of (3b), it becomes apparent that the relationship of the adjective, proud, to the prepositional phrase is different in the two sentences. In (3b), John is a father who is proud of his job; in (3a), John is a father of twins who is proud<sup>1</sup>. In other words, a proud father of his job, but not a proud father of twins, has a relative clause source in which the prepositional phrase is part of the relative clause. Underlying (3a) and (3b) would be (5a) and (5b) respectively.

(5)a. a father of twins [who is proud]

b. a father [who is proud of his job]

Thus, (3b) falls into the same class as (6a), which would come from the structure underlying (6b) and not from (6c):

(6)a. \*John is a fond boy of his dog.

b. John is a boy who is fond of his dog.

c. \*John is a boy of his dog who is fond.

Such examples show that AF must be constrained.

To account for such facts, Lakoff (1970) added the following condition to the rule: "the permuted element in ADJ-SHIFT is a verb phrase that ends in adjective/verb (p. 123)". Lakoff also noted examples such as (2b) in which the verb phrase does end with a verb, but neither (1A.4) nor (7) is grammatical:

(7) \*John was an eager to leave man.

To rule out such cases, Lakoff added the following condition: "the verb phrase must immediately dominate the final adjective/verb (p. 123)". Thus, in (7) the relevant VP does not immediately dominate the final verb, leave, and so AF can not apply. Moreover, Lakoff's constraint would, according to his analysis, allow the derivation of (8a) from (8b):



this analysis of Tough Movement creates a curious asymmetry in the formulation of Raising Rules in general. The question arises as to whether Tough Movement, i.e., object-to-subject Raising, should also be stated independently of Extraposition, directly relating sentences such as:

(10)a. To fake out John is tough.

b. John is tough to fake out.

It has been fairly commonly accepted that Extraposition is post-cyclic (see for example Ross 1967:146-150, McCawley 1970:288)<sup>2</sup>. If this is true, then Tough Movement would have to be post-cyclic also, since it supposedly operates on the output of Extraposition. But it is fairly easy to show that Tough Movement is, in fact, a cyclic rule and so can not be dependent upon Extraposition. For instance, some speakers find sentences such as (11) acceptable:

(11) John is tough to consider to be easy to please.

(It is tough to consider John to be easy to please)

In (11), John can not be raised into the subject position of the matrix S until after it has undergone Tough Movement in the embedded S which is governed by easy and then raised into object position of the next higher S by subject-to-object Raising. Since Tough Movement must precede and follow a cyclic rule (subject-to-object Raising), it must also be cyclic. Additional evidence for the cyclic nature of Tough Movement comes from the fact that many speakers accept sentences such as (12):

(12) John is believed by many to be tough to convince to study.

In (12), Tough Movement feeds a cyclic rule and so, assuming there are no pre-cyclic rules, must be cyclic. But even if pre-cyclic rules do exist, Tough Movement can not be post-cyclic. Hence, given that Extraposition is post-cyclic, then Tough Movement can not be dependent upon it.

Thus, Lakoff's assignment of different derived constituent structure to sentences such as John is easy to please and John is eager to please is not very well motivated. If eager to please/easy to please do have the same derived constituent structure prior to AF, then clearly Lakoff's constraint will be inadequate. There is, furthermore, stronger evidence which undermines the constraint proposed by Lakoff.

## 2. Targeting

Central to this study is the notion of target structure, which can be informally defined as follows:

- (13) Any superficial structure in a language L which has distinct underlying structures mapped into it by <sup>3</sup>rules of a grammar G of L is called a target structure of L.

This concept should be distinguished from the related but distinct notion of linear sequence of categories, which is structure independent (sometimes referred to as word order). This latter concept can be loosely defined as follows:

- (14) Any linear sequence of categories in a language L which has diverse underlying structures mapped into it by <sup>4</sup>rules of a grammar G of L is called a target pattern of L.

A classic example of a target structure is the form:

- (15) NP - be - [<sub>VP</sub> V - to VP]

Two sentences which have traditionally been assumed to conform to this pattern are (16a & b):

- (16)a. John is easy to please.  
b. John is eager to please.<sup>5</sup>

(16a) comes from a structure like (9a) and (16b) from one like (17):

- (17) John is [<sub>VP</sub>eager [John please x]]

Following Lakoff's (1966) analysis of subject-to-subject raising,<sup>6</sup> another instance of (15) would be:

- (18) John is likely to succeed.

The following two sentences have the same target pattern, but different superficial structures, and so the conditions for a target structure are not met.

- (19)a. Mary found someone big.  
b. Mary painted the house red.

(19a) and (19b) both have the superficial pattern:

- (20) NP - V - NP - Adj

(See Green 1973 for a discussion of these types of sentences and their structures.) Someone big in (19a) is derived from a relative clause, someone who is big, by Whiz Deletion. The house red in (19b), on the other hand, can not be derived from the relative clause the house that is red, since the house is red as a result of Mary's painting it. Hence,

(19b) must come from a very abstract source such as "Mary caused the house to become red by painting it". Whatever the correct analysis is for (19b), (19a) and (19b) certainly have different underlying structures. Moreover, in view of the foregoing discussion, it should be evident that they have different surface structures as well, roughly:

- (21)a. Mary found [someone big]
- b. Mary painted [the house] [red]

## 2.1. Zeroing In

Sentences such as (22a & b) are counterexamples to Lakoff's proposal, since they both have intermediate stages with relative clauses of the form (15) and so AF should be blocked just as it is for (22c):

- (22)a. John was a wise man to leave.
- b. John was a clever fellow to leave.
- c. \*John was an eager man to leave.

The relevant intermediate stages are:

- (23)a. John was a man [man be [wise to leave]]
- b. John was a fellow [fellow be [clever to leave]]
- c. John was a man [man be [eager to leave]]

The claim that (22a) and (22b) constitute counterexamples to Lakoff's constraint rests upon two things: (1) Lakoff's (1966) analysis of the rule of subject-to-subject Raising and (2) the fact that wise-class adjectives (wise, clever, idiotic, dumb, etc) trigger Raising.

According to Lakoff's analysis the raising rule which relates (24a) and (24b) does not operate on the output of Extraposition as proposed by Rosenbaum (1967), but directly raises the subject of the embedded clause and attaches the embedded VP to the right of the VP of the higher S.

- (24)a. [For John to run] began
- b. John [began to run]

Under this widely accepted analysis, began to run is a constituent. Lakoff's evidence is based upon two observations: (1) intuitively, native speakers feel that begin to run/begin running are constituents (he compares this to likely that John will leave where it seems correct to say that there are two constituents, likely and that S), (2) do so



can not replace part of a VP (using Lakoff's examples, we can say I caught a salmon and John did so too, but not \*I caught a salmon and John did so a sardine). He goes on to observe that John began to run and Harry did so to swim is ungrammatical, just as would be expected if begin to VP is a constituent. This analysis is assumed to be correct in this paper.

There is good evidence that wise-class adjectives trigger Raising.<sup>7</sup> These adjectives pattern exactly like 'regular' subject-to-subject Raising verbs and adjectives: (1) They take sentential subjects and (2) they have sentences of the form NP - be - Adj - to VP which are synonymous to those mentioned in (1):

- (25)a. For John to leave was wise (of him).  
b. John was wise to leave.

Compare:

- (26)a. For John to go is likely.  
b. John is likely to go.  
(27)a. For John to leave appeared (unlikely).  
b. John appeared (unlikely) to leave.

If the Raising analysis is assumed for the wise-class adjectives, then nothing new need be added to the grammar to account for (25). The significant aspect of this is that such an analysis along with Lakoff's constraint on AF would incorrectly predict that (22a) and (22b) are ungrammatical.

2.2. Sentence (22a) is ambiguous with respect to whether John or an unspecified individual is the subject of to leave. Compare (28a) and (28b), which are unambiguous:

- (28)a. John was a wise man to leave New York.  
b. John was a wise man for you to leave.

The derivation of (28a) is straightforward:

- (29)a. John was a man [[for man to leave New York] be wise]<sup>8</sup>  
↓ Raising  
b. John was a man [man be [wise to leave New York]]  
↓ Relativization  
Whiz Deletion

- c. John was a man [wise to leave New York]



Adjective Flipping

- d. John was a wise man to leave New York.

The derivation of (28b), however, is more problematical. The underlying structure is presumably:

- (30) John was a man [[for you to leave man] be wise]

Wise-class adjectives do not undergo Tough Movement:

- (31)a. \*John was wise for you to leave.

- b. \*John was clever for you to help.

and so this rule can not be of any help in the derivation of (28b).

Suppose that Relativization (including Wh-Fronting) could apply directly to man in (30), i.e., suppose that the sentential subject constraint can be violated provided that there is no surface indication of the offense. This would not help either, since for you to leave will be on the wrong side of wise. The only reasonable 'next move' is to apply Extraposition, which is applicable to wise-class adjectives in general as (32) illustrates:

- (32)a. It was wise for John to leave.

- b. It was wise of John to leave.

- c. It was wise of John for him to leave.

Applying Extraposition to (30) yields:

- (31) John was a man [it be wise [for you to leave man]]

Now, Relativization can apply with impunity, which results in:

- (32) John was a man who it was wise for you to leave.

But Whiz Deletion can not apply to (32), given its standard formulation, since it supposedly deletes only a Wh element and the copula (if it is present at that point).

There are two possible solutions: (1) Whiz Deletion could be extended or (2) it could be claimed that the appearance of the it is not, strictly speaking, part of the Extraposition rule, but is inserted very late to patch up errant surface structures<sup>9</sup>. Such a patch up rule would, most likely, have to be global in nature. This alteration in Extraposition would make the rule more universal, since a number of languages with such a rule do not require a dummy subject. The correct solution will have to await future research.

It will be assumed then that (somehow) a structure similar to (if not identical to) (32) undergoes Whiz Deletion and finally AF:<sup>10</sup>

(33)a. John was a man wise for you to leave.

↓      Adjective Flipping

b. John was a wise man for you to leave.

Now if the subject of the embedded sentence is unspecified, then the result is the ambiguous (22a). (22a) has the interesting property of having one underlying structure, NP - be - NP [<sub>S</sub> [<sub>S</sub> NP-V-NP] Adj], one surface structure, NP - be - [<sub>NP</sub> [<sub>NP</sub> Det - Adj - N] - to VP]], and two derivational histories -- one involving Raising, the other Extraposition. (22a) seems to be the result of a rule 'conspiracy' (a term introduced first by C. Kisseberth in phonology), yet it does not fall under the definition of target structure or target pattern given at the beginning of this section. This is unfortunate, since the overall effect in both cases is to reduce the number of surface forms. Taking into account the 'targeting' properties of this second type of rule conspiracy, I propose the following definition:

(34) Derivational Target Structure

S is a derivational target structure if

(a) S is a target structure, or

(b) There is more than one derivational route from a given underlying structure U to the superficial structure S.

3. The Adjective Flipping Constraint

The derivational target structure

(35) NP - [Adj - to VP]

as exemplified by the reduced relative clauses in (2b), (8b), and (29c) and the grammaticality of (8a) and (25b) (on both readings) indicates that Lakoff's original proposal for constraining AF must be supplanted. The most striking thing about such sentences where the adjective can be flipped is that the sister phrase of the adjective is derived, i.e., the phrase is not a right sister of the adjective in the underlying structure. These observations lead to the following generalization:

(36) The Adjective Flipping Constraint (AFC)

Mark as ill-formed any derivation in which:

(1) The rule of Adjective Flipping has applied to an Adjective A, and

- (2) At the point where Adjective Flipping applies, A has a right sister R, and
- (3) The corresponding constituent of R is the right sister of the corresponding constituent of A in the underlying structure of the derivation.

The AFC is a global derivation constraint, i.e., a non-transformational filter. Furthermore, as formulated the AFC must refer to two non-consecutive stages in a derivation, since the underlying structure can be separated from the point of application of Adjective Flip by Tough Movement or Raising, Relativization, and Whiz Deletion.

### 3.1. A Possible Reformulation

Following Postal (1972), we might attempt to use Lakoff's (1970:22) rule features to state the AFC at one level, namely, the output of AF. Notice that the adjective can not be flipped if it has triggered Equi-NP-Deletion (Cf. (1A.4), (1B.6), (8b)). Thus, the AFC might be reformulated as follows:

(37) Mark as ill-formed any derivation in which:

- (1)a. AF applied to A, and
- b. A is marked [+EQUI]

(37) as presently stated will not mark (1A.1), (1A.2), and (1A.3) as ill-formed, unlike (36), which blocks these as well as (1A.4). To account for these facts, a second condition would have to be added to the effect that: "If AF applied to A and A had, at the point of application of AF, a right sister that was not a VP, then the derivation is ill-formed". But such a reformulation of the AFC would claim that (1A.4) and (1A.1, 2, & 3) are ungrammatical for totally different reasons, that is, it does not capture the generalization that (36) does. Furthermore, (37) makes the claim that the application of Equi-NP-Deletion is relevant to whether or not AF applies correctly, which seems totally incorrect. Finally, it should be noted that this use of rule features is really an ad hoc way of encoding the relevant derivational history of sentences -- whether or not the adjective has an 'underlying right sister' at the point where AF applies. In conclusion, the use of rule features seems inappropriate for the statement of the constraint on flipping adjectives (assuming it would be descriptively adequate).

#### 4. Some Apparent and Some Not So Apparent Counterexamples

##### 4.1. Comparatives

Comparative constructions such as (38) appear to violate the AFC.

(38)a. John is a person who is nicer than Bill.<sup>11</sup>



Whiz Deletion

b. John is a person nicer than Bill.



Adjective Flipping

c. John is a nicer person than Bill.

For the sake of discussion, it is being assumed that (38a) underlies both (38b) and (38c). Consider just the relative clause of (38a), who is nicer than Bill, which is underlyingly something like:

(39) Person is nicer than Bill

In (39), the phrase than Bill appears to be a complement of nicer, i.e., (39) would be parsed as [person.is] [nicer] [than Bill]. Now the question arises as to whether this constitutes a violation of the AFC. The answer to this depends upon whether than Bill is an 'underlying right sister' of the adjective nicer and this, in turn, depends upon an adequate analysis of comparative constructions. A number of linguists (e.g., Bartsch and Venneman 1972) have argued that in all comparative constructions the primary predicate is either "more", "equal", or "less" (these three predicates are considered to be semantically primitive). For example, the primary predicate of (39) would be "more". The arguments of these binary predicates are measure functions, which are roughly paraphraseable by "the degree to which x is Adj." For instance, a rough paraphrase of the underlying structure of (39) would be (40):

(40) The degree to which person is nice is more (than) the degree to which Bill is nice.

In (40), the construction (than) Bill is nice does not appear as a complement of nicer, rather it is part of the second argument of more, and hence it is predictable that the AFC does not apply to (38b).

##### 4.2. Prepositional Phrases

It was noted earlier that sentences such as (41a, b, & c) are ungrammatical:

- (41)a. \*John is a fond boy of his dog.
- b. \*John is a mad boy at his mother.
- c. \*John is a scared man of his shadow.

The explanation that was given was that in all three the prepositional phrase was a right sister of the flipped adjective and so the AFC blocked the derivation. If the AFC is correct, then it would allow the conclusion that the prepositional phrases in the following sentences are not underlying right sisters of the flipped adjectives.

- (42)a. John is a good coach in a pinch.
- b. John is a good athlete for an alcoholic.
- c. John is a happy man in the summer.

Considering (42b), I would suggest that the underlying source for it involves a semantic complement to the adjective good that specifies the dimension along which the subject is judged to be good and that, consequently, the prepositional phrase, for an alcoholic, can not be an underlying right sister (complement) of the adjective. The underlying semantic complement is deleted in the course of the derivation, since it is recoverable from the head of the predicate nominal, an athlete. Underlying (42b) would be a structure something like (43):

- (43) John be an athlete [athlete be [good at athletics] for an alcoholic]
- 'John is an athlete who is good at athletics for an alcoholic'<sup>12</sup>

If the underlying semantic complement in a sentence such as (42b) is not recoverable, then it is not deleted and the adjective can not be flipped:

- (44)a. John is a swimmer who is good at basketball.
- b. \*John is a good swimmer at basketball.

In conclusion, sentences such as (42) actually appear to support the AFC.

#### 4.3. The too-Adj Construction

There is a class of sentences which is similar to those discussed previously, except that the adjective is modified by the degree adverb too. A peculiarity of this type of construction is that the adverb-adjective pair is flipped to the position immediately in front of the determiner:<sup>13</sup>

- (45)a. Rex is a dog that is too dumb to learn tricks.
- b. Rex is too dumb a dog to learn tricks.
- c. Rex is a dog that is too lazy to feed.

(45)d. Rex is too lazy a dog to feed.

e. Rex is a dog that is too eager to learn tricks.

f. Rex is too eager a dog to learn tricks.

The too Adj construction is apparently flipped by a rule that is very similar to the regular AF; call it AF'. Superficially, if the too Adj construction obeyed the AFC (suitably modified), one would expect (45f) to be ungrammatical, parallel to (1A.4). However, a close inspection of (45e & f) indicates that (45e) is ambiguous and (45f) is not. This difference provides a clue to the solution of the above problem. The ambiguity of (45e) is the following: (1) Rex could be an overly eager dog in general (e.g. as puppies often are) and because of this general eagerness be untrainable (the general reading) or (2) Rex could be eager in just one specific respect -- to learn tricks (the specific reading); in other ways Rex might be well-behaved or even lazy.<sup>14</sup> Contrasting (45e) and (45f), it can be seen that (45f) has only the general reading (1). But this is exactly what would be predicted if the AFC applies to too Adj constructions. The specific reading is parsed as too [Adj to VP], where the to VP phrase is an underlying right sister of the adjective and so the adjective can not be flipped. The general reading is parsed as [too Adj] [to VP], i.e., the adjective does not have an underlying right sister present at the point where AF' applies and so the adjective (actually too Adj) can be flipped. In other words, the AFC has applied to the derivation of (45f) and has wiped out one reading -- the specific one. The specific reading would have the following approximate underlying structure:

(46) Rex is a dog [dog is too [eager [dog learn tricks]]].

There is still the problem of assigning an underlying structure to the general reading of (45e). On either the specific or general reading this construction is semantically a comparative. For instance, the specific reading of (65e) is something like: "the degree of Rex's eagerness to learn tricks is greater than the upper limit of eagerness to learn tricks that still allows Y" where Y is contextually determined or explicitly stated (to suit me, to give away, etc.). The general reading is something like: "the degree of Rex's eagerness in general is greater than the upper limit on the degree of eagerness in general that still allows Y" where Y is "to learn tricks". Hence, I propose tentatively the following approximate underlying structure for the general reading of (45e):

(47) Rex is a dog [dog is [too [eager X]] [dog learn tricks]]  
 In (47), X represents whatever it is that underlies the general reading of too eager. The important point is that dog learn tricks, which surfaces as to learn tricks, is not an underlying right sister of the adjective and that X, which is an underlying right sister, is (presumably) deleted before AF' applies. Hence, the AFC is inapplicable to (47), which allows the generation of (45f).

4.4. Sentences with so Adj that S constructions might appear to be counterexamples to the AFC. For example:

- (48)a. John is a man who is so lazy that he won't even eat.
- b. John is so lazy a man that he won't even eat.

Notice that (49a) is unambiguous and that (49b) is grammatical:

- (49)a. John is a man who is too lazy to hire.
- b. John is too lazy a man to hire.

Both of these observations follow if lazy does not take a specific complement. Compare the examples in (50a & b):

- (50)a. John is a student that is so eager that he fails every test.
- b. John is so eager a student that he fails every test.

Again, the unflipped version has only a general reading and the flipped version is grammatical. Not surprisingly, in cases such as (48a) and (50a), I claim that the parsing is:

- (51) John is NP [NP is [so Adj] [that S]]

in which that S is not a right sister of the adjective. If the that S construction is a true underlying right sister of the adjective, then the AFC does block the flipped version, as illustrated in (51):

- (51)a. John is a man who is scared that he'll flunk.
- b. \*John is a scared man that he'll flunk.
- c. John is a father that is certain that his children are his.
- d. \*John is a certain father that his children are his.

So the so Adj constructions support the AFC (revised so as to apply to AF' as well -- this is easily done by allowing the term Adjective Flipping to refer ambiguously to both of these flipping rules).

## 5. Some Exceptions

Most, if not all, linguistic generalizations have exceptions, and the AFC is certainly no exception to this. There is a class of



adjectives which do not have underlying right sisters present at the point where AF applies and yet the adjectives can not be flipped with impunity. This class includes such adjectives as likely, certain, and sure:

- (52)a. \*John is a certain man to win.
- b. ?John is a likely man to win.
- c. ?John is a sure man to win.

Following tradition, the sentences in (52) are assumed to have the underlying structure:

- (53) [NP VP] be Adj

The derivation of the sentences in (52) would be essentially the same as the wise-class sentences: Raising, Relativization, Whiz Deletion). At present, I have no explanation for these exceptions and must mark them simply as [- Adjective Flip].

#### 6. Generalizing the AFC

One might wonder whether the constraint on flipping is not really a consequence of a more general constraint on chopping the heads of adjective phrases. It is true that adjectives that have underlying right sisters at the relevant point in a derivation can not be chopped in general:

- (54)a. \*Eager, Bill is to please.
- b. \*Bill is eager to eat and Mary to leave.

Hence, it might seem reasonable to propose the following general constraint:

- (55) No adjective can be chopped that has an underlying right sister when the chopping rule applies.

But notice that even adjectives that have derived right sisters can not, in general, be chopped:

- (56)a. \*Easy, John is to please.
- b. \*Wise, Bill was to leave.
- c. \*Bill is easy to despise and Mary to respect.

Thus, excluding the rule of Adjective Flip, it appears that there is a very general constraint on chopping adjectives which subsumes (56):

- (57) Mark as ill-formed any derivation in which an adjective is chopped that has a right sister.

Unfortunately, it is still necessary to state the fact that Adjective

Flipping is an exception to (57):

- (58) Adjective Flipping is an exception to (57) if the right sister is derived.

In either case, the conditions governing when an adjective can be flipped and when it can not must be stated separately and so, in essence, the AFC can not be eliminated. It is an interesting problem why Adjective Flipping should be subject to different restrictions than other chopping rules.

Since AF also flips participles, it is natural to inquire whether the AFC should be generalized to include them. Interestingly, participles (at least present participles) have heavier restrictions on their flipping. It appears that present participles can not be flipped unless they are underlyingly intransitive and have no derived right sister:

- (59) Underlyingly Transitive

- a. \*The eating boy
- b. \*The washing man
- c. \*The driving man
- d. \*The looking person
- e. \*The mowing kid

- (60) Underlying Intransitive

- a. The sleeping child
- b. The growing teenager
- c. The blooming flower
- d. The rising sun
- e. The flowering plant
- f. The revolving door

- (61) Derived Right Sister

- a. The man appearing to be winning.
- b. \*The appearing man to be winning  
which comes from:
- c. The man [[man win] appear]

Past participles behave differently. If an underlyingly transitive verb is passivized and Agent Deletion takes place, then flipping can occur:

- [illegible]

(Cf. the beaten/aggravated man; the completed plan)

The important point for the purposes of this paper is that participles do not fall under the AFC. The very general constraint on flipping present participles is sufficient to establish this.

## 7. Complications

Although the AFC appears to be a valid generalization in some sense, the exact form it should take depends upon one's concept of underlying structure and particular analyses of given sentences. For example, Berman (1973) claims that all Tough Movement adjectives have an underlying dative for NP phrase as a right sister and that if a for NP shows up in the surface of a sentence that has undergone Tough Movement, then this phrase is always the matrix dative and never the for NP of the embedded clause. According to this analysis, we have:

- (63)a. John is easy for you [to please]

from

- b. [for you to please John] easy for you

Given this analysis, the AFC would incorrectly block the derivation of (64):

- (64) John is an easy man for you to please.

Thus, Berman's analysis would appear to provide a counterexample to the AFC.

That it is not a true counterexample can be seen from the following considerations. It seems clear that the relationship of the to VP in eager to please and the of NP in fond of his dog have a different relationship to the respective adjectives than does the for NP in (63). In more traditional terms, one would say that in the former case the adjectives take an 'object', but one would never characterize the dative phrase of tough type adjectives as 'objects'. Within the framework of

transformational generative grammar, this semantic difference must be captured structurally. In short, even if Berman's claims are valid, a structural difference of some sort must be postulated to account for the above observations. Given that this is so, then the AFC could be reformulated in terms of this structural difference. If underlying phrase nodes are admitted into the grammar, then the solution would be simple: we could simply refer to a right sister of an adjective that is directly dominated by a VP node (or AP node, if adjectives are not considered verbs). Such a formulation would exclude (64) from the AFC by not making for NP part of a VP in (63). Without underlying phrase nodes, another solution is possible. Consider:

(65)a. John was mad at work (locative)

b. John was mad at his work.

Taking a generative semanticist viewpoint, the locative at can be considered a higher predicate, and so the prepositional phrase would not be an underlying right sister of the adjective as desired. Returning to (63b), it does not seem as 'natural' to make the dative a higher predicate, but perhaps one could argue that it comes from an abstract verb of experience. In any event, I think that (65b), among others, must be structurally distinct from (65a) and (63b) in the relevant aspects (within the framework of transformational grammar) in such a way that the AFC can be formulated in a straightforward manner as in (36). In fact, one could take the inability to give a straightforward statement of the AFC within a certain grammatical framework as an indication that the framework is seriously deficient. It is outside the scope of this paper to analyse in detail the various possible specific formulations of the AFC and to investigate their ramifications. Suffice it to say here that I think the best solution is to formulate the constraint directly in terms of the relational notion 'object of', but this presupposes a grammatical framework that is very different from 'standard', categorial transformational generative grammar and so is too involved to be discussed here (see Johnson, 1974, for a detailed proposal).

To conclude this section, it was argued that within the framework of 'standard' (non-relational) transformational generative grammar that the statement of the AFC would vary depending upon one's notion of underlying

structure. However, such variation would be in detail and not in 'essence' (if one accepts the claim that wise to leave and eager to please have the same constituent structure at the point where AF applies), i.e., the AFC will be a global derivational constraint.

## 8. Conclusion

It was argued that there exists a global derivational constraint on the flipping of adjectives. The argument rested upon the claim (A) that a derivational target structure, NP - [Adj to VP], exists prior to Adjective Flipping and on the observation that only certain instances of this derivational target structure are subject to flipping. A specific formulation of the constraint was given (36), but it was later pointed out that the adequacy of the formulation was heavily dependent upon one's assumptions concerning underlying structure. However, given claim (A), any formulation of the constraint within a categorial transformational grammar will involve derivational history and hence a global derivational formulation appears unavoidable.

Two important points emerge: (1) Derivational target structures are likely spots to find global derivational constraints, since a language only tolerates a certain amount of structure collapsing and (2) An adequate account of Adjective Flipping and the conditions that govern it can only come after a great deal more is known about the nature of language as a whole.

## FOOTNOTES

\* I would like to thank Georgia Green, Jerry Morgan, and my wife, Jessica, for their comments on this paper. All errors are my own.

<sup>1</sup> Of course, it is probably true that what made John proud is the fact that he is a father of twins.

<sup>2</sup> This claim has not gone unchallenged. Grinder (1970) in his paper "Super Equi-NP Deletion" presents some data that suggests that Extraposition is cyclic. This problem needs more work done on it. Sentences such as

(i) Mary believes it to be likely that John will come.  
have been offered as evidence that Extraposition is cyclic, since it looks as if the dummy it has been raised. However, as Jerry Morgan has observed, it could just as well be the case that the entire S, that John will come,

has been raised into object position and then extraposed postcyclically. The latter analysis predicts that to be likely that John will come is not a constituent, which seems correct.

<sup>3</sup>See Green (1973) for some discussion of target structures.

<sup>4</sup>This definition should include relational notions such as 'subject' and 'object' as well as syntactic categories, since target patterns are typically given in such terms, e.g., SVO, SOV, VSO, etc. Perhaps the term 'categories' should be replaced by the more neutral term 'elements', of which there would be two types: (i) categorial, (ii) relational.

<sup>5</sup>See for example, Chomsky (1962) and Katz and Postal (1964). Following Lakoff (1970), adjectives will be considered to be verbs that are marked [+adjective].

<sup>6</sup>See section 2.1 for a brief discussion of Lakoff's proposal.

<sup>7</sup>See Wilkinson (1970) for a discussion of the derivation of wise-class adjectives as well as Rosenbaum (1967).

<sup>8</sup>Underlined NPs are coreferential. This notation and the representation of NPs in relative clauses are completely ad hoc; presumably these matters are irrelevant to the present study. Also, the problem of the of NP phrase that shows up with wise-class adjectives is being ignored.

<sup>9</sup>This possibility was suggested by Jerry Morgan.

<sup>10</sup>For some people, if the embedded subject is unspecified and subsequently deleted then, after Whiz Deletion, AF is obligatory, i.e., John is a man wise to leave is unambiguous, but John is a wise man to leave is ambiguous. There is probably a transderivational constraint lurking about here.

<sup>11</sup>It appears that some comparatives can not be reasonably derived by Adjective Flipping, e.g., the famous pair: Bill is a man who is more successful than Mary vs. Bill is a more successful man than Mary. This is another problem that is too complex to be dealt with here.

<sup>12</sup>These structures are given in this manner for expository purposes; a more precise presentation would be in terms of some semantic formalism, i.e., I am not claiming that at athletics is literally part of the underlying structure, rather this phrase conveys the gist of what is there semantically.

<sup>13</sup>This construction was pointed out to me by Jerry Morgan.

<sup>14</sup>Georgia Green has pointed out that only the general reading allows a negative polarity item in the infinitive phrase:

(i) Rex is a dog that is too eager to be of any/much use.

(ii) Rex is too eager a dog to be of any/much use.

Cf. (iii) \*John is a man who is eager to be of any/much use.

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INFLECTIONAL ACCENT OF THE SERBO-CROATIAN NOUN

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In two recent studies Morris Halle (1971, 1973) has developed a general theory of Slavic accentuation which answers many questions that have puzzled scholars for over a century. The basic idea is that Proto-Slavic was a pitch-accent language of the following kind: a particular vowel of the word was assigned a high pitch (largely on the basis of grammatical and idiosyncratic lexical properties); all preceding vowels in the word were then assigned a redundant high pitch and the syllable with the tone-break was identified as the accented syllable. In his 1971 publication Halle has given a brief sketch of how this system has evolved into the accent systems of 20th century Russian, Slovene, and three dialects of Serbo-Croatian. In Halle (1973) there is an exhaustive description of Russian accentuation in terms of this system.

In the present paper my goal is to describe the inflectional accent of the nouns of Standard Literary Štokavian Serbo-Croatian in terms of the general system developed by Halle. To a large extent this is an exercise in lily gilding, because most of the accentual alternations in SC find a rather easily recognized and motivated interpretation in terms of Halle's system. This in itself shows the fruitfulness of Halle's proposal. However, rather than simply superimposing his system on the data, I shall attempt to consider the data on its own terms and show how the general system arises naturally from an analysis of the alternations. Finally, I shall attempt to do this in a fashion that will be readily comprehensible to non-Slavists.

The language being analyzed in this paper is the literary dialect of the Štokavian variety of Serbo-Croatian. This dialect was first described by Vuk Karadžić (1797-1864) in his Srpski rječnik (1818) and systematized by his pupil Duro Daničić during the last century. Prosodically, this "Vukovian" system distinguishes two tones (rising and falling), stress, and length. During the past 100 years the Vukovian system has deteriorated to the point where stress is the only universally obligatory prosodic feature to be found in the modern urban dialects,

while rural dialects preserve in varying degrees the oppositions of length and tone.<sup>1</sup> My major source of data has been the exhaustive description of J. Matešić (1970) which contains literally hundreds of accentual paradigms culled from all of the important descriptions of the past 100 years.

In his description of SC, Karadžić employed four accent marks: `` and ` indicate falling and rising accents on short syllables, while ^ and ´ mark falling and rising on long syllables. In addition, the macron has been used to distinguish long vowels in post-accentual position (in pre-accentual position there is no opposition of length phonetically). Examples (from Magner and Matejka 1971):

(1)	pŭčina	'surface of the sea'	pŭčina	'large crowd'
	ŭmiti	'to reason'	ŭmiti	'to wash'
	lŭčīm	'I paint'	lŭčīm	'I resemble'
	pŭstīm	'I empty'	pŭstīm	'I become empty'
	pās	'dog'	pās	'belt'
	lŭk	'onion'	lŭk	'arch'
	pèro	'pen'	Péro	man's name
	slàgati	'to tell a lie'	slàgati	'to stack up'
	plàmen	'fiery'	plàmēn	'flame'
	òpisan	'descriptive'	òpīsān	'described'

Since length is contrastive in both accented and unaccented syllables, it is natural to factor out this prosodic opposition, leaving an opposition of rising versus falling tone. When this is done, some peculiar distributional properties emerge.

(2)

(i) falling accents are limited to word-initial syllables:

dēd	'grandfather'	dvōr	'palace'
glàgol	'verb'	zbōrnĭk	'code'
ŭčenĭk	'pupil'	glâvničār	'capitalist'
lâstavica	'flying fish'	glâvničāra	" g.s.
pòlumesecān	'semi-monthly'	glâvničārĭma	" d.pl.

(ii) rising accents never appear on final syllables:

jèlen	'deer'	národ	'nation'
sinôvac	'nephew'	mináret	'minaret'
kândilo	'icon lamp'	náplatak	'rim (of wheel)'
golûbarník	'cubby hole'	ubéditi	'to convince'
činovničíc	'bureaucrat'		
ôbesiti	'suspend'		

(iii) monosyllables are thus all falling:

kônj	(g.s. kônja)	'horse'	dvôr	(g.s. dvóra)	'palace'
dêd	(g.s. dêda)	'grandfather'	glâs	(g.s. glâsa)	'voice'

These distributional limitations imply that the opposition between rising and falling tone is only possible in the initial syllable of a polysyllabic word (cf. 1). In the face of this limited opposition, many phonologists have sought to reduce the system to one underlying accent in such a way that the distributional gaps could be filled. One of the most popular of these reanalyses has been to follow auditory impressions<sup>2</sup> and to consider the rising tone as occurring over two syllables. From this point of view, a form like dvóra would be represented as /dvô:rá/, while glâsa would be /glâ:sa/. As Browne and McCawley (1965) have pointed out, this reanalysis automatically explains why rising accents can never appear on final syllables (the phonetic syllable marked with  $\tilde{v}$  or  $\tilde{v}$  must be followed by a syllable with an underlying accent  $\tilde{x}$ ), but it fails to explain why the falling accent is limited to initial position: there is no reason why just a single  $\tilde{x}$  could not appear on a medial syllable. However, this restriction can be easily explained once it is realized that the first  $\tilde{x}$  in a  $\tilde{x} \tilde{v}$  sequence is always predictable from the second. In other words, we can represent dvóra as /dvo:rá/ and formulate a rule to the effect that a non-initial accent is always realized phonetically as a rising accent on the immediately preceding syllable. glâsa would be represented as /glâ:sa/; since there is no preceding syllable, this form will come out with a falling tone. This insight is the key to the understanding of the entire accent system and is a reflex of the famous "Štokavian accent shift".<sup>3</sup>

The relatively recent phonetic investigations of Lehiste and Ivić (1963) have provided striking support for the thesis that rising accents originate from an underlying accent on the following syllable. For our purposes the most important results of their study are the following. First, "in many instances the tonal movements observed in syllables with /ˊ/ and /ˋ/ were quite similar in direction and shape, which excludes the possibility that the differences between these movements carry the phonological distinction" (p. 20). In other words, in minimal pairs like pŭćina vs. pŭćina they found no consistent difference in the initial syllables which would explain how speakers of SC distinguish these words. But in long syllables they did find a consistent difference between the rising and falling tones: in /ˊ/ the first quarter of the syllable is marked by a high peak, which is then followed by a fall to a relatively low FF, while in syllables marked with a /ˋ/ there was a slight rise in FF. Finally, and most importantly, Lehiste and Ivić state

the most important difference between words with rising and falling accents on the first syllable appears in fundamental frequency patterns of the second syllable. In all instances, the fundamental frequency of the syllable following a falling accent is significantly lower than the fundamental frequency of the syllable following a rising accent. The peak fundamental frequency of the syllable following a syllable with rising accent is comparable to or higher than the peak fundamental frequency of the syllable carrying the rising accent. In syllables following a so-called falling accent, the fundamental frequency is usually falling; the highest fundamental frequency occurs immediately at the beginning of the syllable, and the syllable contains no separate fundamental frequency peak. (pp. 20-21)

In other words, in minimal pairs like pŭćina vs. pŭćina and lŭćim vs. lŭćim even phonetically the major prosodic opposition is to be found in the second syllable: in the first members of these minimal pairs the second syllables are relatively low pitched, while in the second members they are relatively high pitched. This of course is in complete agreement with the interpretation developed earlier on phonological grounds whereby these words would be represented as /pŭćina/ vs. /pŭćina/ and /lŭćim/ vs. /lŭćim/.

Now if the significant difference between pŭćina vs. pŭćina is in the second syllable, the question naturally arises as to why the differences are marked over the first syllables in the Vukovian system. That is, why is there any mark at all on the first syllable of pŭćina? The answer here is that as far as the location of the accent is concerned, Vuk was probably attending to the position of stress. That is to say, in both pŭćina and pŭćina the initial syllables are stressed. The phonetic investigations of Lehiste and Ivić once again provide support for this interpretation. In their study they found that syllables marked with the falling accents /`/ and /˘/ in the Vukovian system have a greater intensity than the immediately following syllables; but with words marked by the rising accents /˘/ and /˘/ there was no significant difference in intensity between these syllables and the immediately following ones. This appears to be inconsistent with the claim that the first syllable of pŭćina bears a stress. However, examination of their data on duration does provide support for this interpretation. Short syllables that are stressed under our interpretation were on the average 13.8 cs., while in immediately post-stress position short syllables were only 9.7 cs. And long stressed syllables were on the average 20.5 cs. in stress position and only 14.7 sc. in post-stress position. This difference in duration can be explained by saying that the longer values are due to stress. This claim that the Vukovian signs are placed on stressed syllables is further confirmed by the fact that when tone distinctions are lost by the younger generations of SC speakers, so that words come to be distinguished by stress alone, forms like pŭćina and pŭćina become homophonous. If the younger speakers were simply replacing tone by stress, we would expect pŭćina to become p'ŭćina, while pŭćina should become puć'ina. The fact that this does not happen also supports the position that in addition to tone, the Vukovian norm also includes stress in its prosodic repertoire.

In view of these facts, I propose to represent pŭćina and pŭćina as synchronically originating from underlying /pŭćina/ and /pŭćina/, respectively. Here the underlining will indicate stress and the /h/

high pitch. Note that under this interpretation stress is predictable from the location of the basic /h/: the stress goes on the syllable immediately preceding the /h/; if there is no syllable preceding the /h/, i.e. if the /h/ falls on the initial syllable of the word, then the stress will fall on the initial syllable.

As mentioned in the first paragraph of this paper, an essential feature of Halle's system is a rule, which we shall refer to as Tone Spread, that specifies all syllables preceding the phonemically accented one as carrying a redundant accent. In this respect Halle is following Jakobson (1963) who proposed that Proto Slavic was a pitch accent language much like some of the dialects of modern Japanese. Although in none of the modern-day Slavic languages do these redundantly accented syllables show up with an accent phonetically, there is good reason to believe that this was true historically. And to the extent that the data motivating this position are still present in the modern languages, it may also be true synchronically. The basic evidence motivating this position is that when the potentially accented vowel (i.e. the one with the tone break) was lost in Slavic, the accent always reverted to the immediately preceding syllable. This is shown primarily by the development of the proto-Slavic lax high vowels \*i and \*u (the so-called "yers") which were "vocalized" to e and o in Russian (to a in SC) when the following syllable contained a yer, and were deleted elsewhere. For example, compare the Russian outcome of the Proto-Slavic forms of životŭ 'belly', an "oxytone" noun in which the accent was on the case ending, with a form like na-jīm-ŭ 'rent' in which the accent was on the root vowel.

	<u>PS</u>	<u>Russian</u>
n.sg.	*život- <sup>h</sup> u	živ'ot
g.sg.	*život- <sup>h</sup> a	život-'a
n.sg.	*na-jīm- <sup>h</sup> ŭ	na-j'em
g.sg.	*na-jīm- <sup>h</sup> a	n'a-jm-a

In each case when the accented yer was lost, the accent shows up on the immediately preceding vowel in the Russian reflexes. This development is rather surprising in view of the fact that Slavic and Russian possess

a rule which places an accent on the initial vowel of an unaccented word. If the underlying Proto-Slavic form were simply život-<sup>h</sup>u, we might have expected this to become život when the yer was lost and then to pick up an initial accent by the independently needed accent insertion rule. The fact that this did not happen and that the accent was always placed on the immediately preceding syllable follows automatically if we assume that Proto-Slavic had a rule of Tone Spread:

život- <sup>h</sup> u	život- <sup>h</sup> a	na-jim- <sup>h</sup> ũ	na-jim- <sup>h</sup> a	
<sup>h</sup> život- <sup>h</sup> u	<sup>h</sup> život- <sup>h</sup> a	<sup>h</sup> na-jim- <sup>h</sup> ũ	<sup>h</sup> na-jim- <sup>h</sup> a	Tone Spread
<sup>h</sup> život	-----	<sup>h</sup> na-jem	<sup>h</sup> na-jm-a	Yer

To get the present-day Russian forms, all we need say is that the first syllable with the tone break was assigned the stress. That is, Russian has a rule which stresses the last vowel in the string of consecutive /h/'s counting from the beginning of the word:

$$\begin{matrix} h \\ v \end{matrix} \rightarrow [+ \text{stress}] / \# X \text{ --- } \begin{matrix} h \\ v \end{matrix} \neq X$$

The corresponding forms for 'belly' in SC are život and živòta which derive from /život-<sup>h</sup>u/ and /život-<sup>h</sup>a/ by a stress placement rule which says that stress goes on the second last /h/ in the string of consecutive /h/'s counting from the beginning of the word.

$$\text{Stress } \begin{matrix} h \\ v \end{matrix} \rightarrow [+ \text{stress}] / \# C_o \langle \begin{matrix} h \\ v \end{matrix} C_o \rangle_o \text{ --- } C_o \begin{matrix} h \\ v \end{matrix}$$

Note that this rule is formulated in such a way that if only the first syllable of the word bears an /h/, then it too will be stressed.

To summarize, we have arrived at the following routine for assigning accent in SC. First, a particular syllable of the word will be assigned an /h/. Tone Spread will then specify all preceding syllables in the word with an /h/. The Stress rule will then stress the syllable preceding the last /h/ in the string of consecutive /h/'s counting from the beginning of the word (and if /h/ is on the initial syllable and the following syllable is /-h/ or there is no following syllable, then stress will be placed on the initial syllable). Finally, we will assume a Neutralization rule which will remove all /h/'s except from the stressed and immediately post-stress syllables. To show how these rules work, the forms pŭčina, pŭčina, živòta, and pàs

'dog' are derived as follows:

/#pucina#/	/#pucina#/	/#život-a#/	/#pas#/	
-----	h	h h	---	Tone Spread
<u>h</u>	<u>h</u>	<u>h</u> <u>o</u>	<u>h</u>	Stress
-----	-----	život-a	---	Neutralization

The least motivated part of this analysis is the Tone Spread rule. In the next section we will bring forth some additional data which supports it.

We now turn to a discussion of the rules for assigning the underlying /h/. The discussion will be limited to the inflectional accents in the nouns, since they exhibit the greatest variety and complexity. Preliminary work on the verbs and adjectives suggests that the rules developed here for the nouns are sufficient to account for the accent in these other categories.

The nouns fall into four major inflectional categories: Ia or the historically "o-stem masculine" nouns; Ib or "o-stem neuters"; II or "feminine a-stems"; and III or "i-stems". Most monosyllabic and a few disyllabic masculine o-stem nouns have (sometimes optionally) the morph -ov intercalated between the stem and the plural endings. Cross-cutting these inflectional categories are three major accentual patterns. The largest number of nouns fall into the so-called "acute" pattern which is characterized by a constant accent on the same syllable of the stem throughout the declension. Nouns that show the reflex of an underlying accent on the ending belong to the so-called "oxytone" class, while "mobile" or "circumflex" nouns reflect an underlying alternation between accent on the desinence and the initial syllable of the word.

Let us begin our analysis by looking at the masculine nouns. In the acute pattern we find examples like the following:

Sg.	n	děd	národ	glăgol	jělen	žăgor
	g	děda	národa	glăgola	jělena	žăgora
	d,l	dědu	národu	glăgolū	jělenū	žăgcrū
	a	děda	nároā	glăgol	jělena	žăgor
	i	dědom	národom	glăgolom	jělenom	žăgorom



Pl. n	dèdi/dèdovi	národì	glàgoli	jèleni	žàgori
g	dèdā/dèdōvā	nārōdā	glāgōlā	jèlēnā	žāgōrā
a	dède/dèdove	národe	glāgole	jèlene	žāgore
d,i,l	dèdima/dèdovima	národima	glāgolima	jèlenima	žāgorima
	'grandfather'	'nation'	'verb'	'deer'	'murmur'

In terms of the system developed earlier, these nouns will be represented as underlying /dèd<sup>h</sup>/, /na:ròd<sup>h</sup>/, /glàgol<sup>h</sup>/, /je'lèn<sup>h</sup>/, /žà:gor<sup>h</sup>/, etc.

Examination of these examples as well as many others like them reveals that there is no way to predict which syllable of the stem will take the underlying /h/. Consequently, this information must be provided in the lexical representation of such stems. The accent in these stems remains essentially unchanged in the declension (the form jèlena will be discussed later). The only rule we need to formulate is a quite general one which lengthens the vowel preceding the g.pl. ending /-a:/.

GPL V → V: / \_\_\_\_ C<sub>o</sub> + a: (g.pl.)

With this rule at our disposal, the g.pl. of dèd 'grandfather' is derived as follows:

/#dèd-a:#/	
-----	Tone Spread
dè:d-a:	GPL
<u>dè</u> :d-a:	Stress

Turning now to "oxytone" masc. nouns, we find patterns like the following:

'horse'	'bundle'	'palace'	'witness'	'dog'
kònj	snòp	dvôr	svjèdok	pàs
kònja	snòpa	dvóra	svjedòka	psà
kònju	snòpu	dvòru	svjedòku	psù
kònjem	snòpom	dvórom	svjedòkom	psòm
kònji	snòpovi	dvóri/dvórovi	svjedòci	psì
kónjā	snòpōvā	dvórā/dvórovā	svjedókā	pāsā
kònje	snòpove	dvóre/dvórove	svjedòke	psè
kònjima	snòpovima	dvórima/dvórovima	svjedòcima	psìma

On the surface a monosyllabic root like kònj exhibits a "metatony" between rising and falling accent, while polysyllabic roots like svjèdok show an alternation in the place of a rising accent. But it is easy to see that both of these alternations are manifestations of the same underlying pattern if rising tones are generated along the lines discussed

earlier. Thus, kònj is from /kònj<sup>h</sup>/, while kònja is from /konj-<sup>h</sup>-a/; svjèdok and svjedòka arise from /svjedòk<sup>h</sup>/ and /svjedok-<sup>h</sup>-a/. That is, in all cases the underlying accent is on the final vowel of the word, which will yield a rising tone on the immediately preceding syllable if there is one, and a falling tone otherwise. The question now is how is this final accent to be assigned by the grammar? Following Halle (1973) we will say that these noun roots are represented as unaccented in the lexicon. They will receive their accents by the Oxytone rule which will place an /h/ on the ending if the word is unaccented. Thus, by this rule the g.sg. forms kònja and svjedòka arise from underlying /konj-a/ and /svjedok-a/, the Oxytone rule giving /konj-<sup>h</sup>-a/ and /svjedok-<sup>h</sup>-a/. Forms like psìma show that when the ending contains two vowels, the /h/ is placed on the first vowel of the ending.

Oxytone nouns taking -ov in the plural regularly fail to show stress on the -ov: dvórovi and snòpovi, not \*dvoròvi and \*snopòvi. This could be explained by saying that -ov forms the first syllable of the case ending, as opposed to the final syllable for the stem, so that Oxytone will place /h/ on -ov. There are, however, mobile nouns where stress does fall on the -ov in the g.pl.: cf. rād, rāda, radòvā 'labor'; mūž, mūža, mužèva 'husband'. Since I will propose that the desinential /h/ in the mobile nouns is also assigned by Oxytone, we must say that in radòva and mužèva the -ov is part of the stem as opposed to the desinence. And if we follow the traditional bias of not complicating the morphology in order to simplify the phonology, then we must say that -ov is part of the stem everywhere. Consequently, in order to derive a form like dvórovi from /#dvo:r-ov-i<sup>h</sup>#, a rule is required that will delete the /h/ from the desinence. Following Halle (1973), I shall call this rule Metatony. It is ordered after Tone Spread and before Stress.

$$\begin{array}{c} h \\ v \end{array} \rightarrow [-h] / \text{ } \underline{\hspace{1cm}} \\ \text{stem}$$

The words dvórovi and snòpovi will now be derived as follows:

#dvo:r-ov-i# /		#snop-ov-i# /		
	h		h	Oxytone
h	h	h	h	Tone Spread
	-h		-h	Metatony
<u>h</u> :		<u>h</u> :		Stress

Aside from oxytone nouns in -ov, there are only a few others that show a reflex of Metatony in the plural. Matešić lists five: lônac 'pot', kônac 'thread', nôvac 'money', ôvas 'oats', and štènac 'puppy'. These nouns have an accentual paradigm like the following:

lônac	lônci
lónca	lônācā
lóncu	lônce
lóncem	lôncima

Ignoring for the moment the length and the a-ø alternation, the form lônci is derived as follows:

/#lonac-i#/

h h h	Oxytone and Tone Spread
-h	Metatony
<sup>h</sup> lô:nc-i	other rules
<u>o</u> :	Stress

Although the Metatony rule has a limited role in the nouns, it is much more active in the verbs and adjectives. But even in these categories it is still a minor rule applying to a memorized list of words.

This leaves just the nom.sg. form of the oxytone paradigm to account for. Historically, the ending was a yer, which always deleted, yielding its accent to the immediately preceding syllable. Instead of attempting to reconstruct this ending synchronically, I will simply formulate the Oxytone rule in such a way that when there is no inflectional ending the /h/ is placed on the last vowel of the word. The final version of the Oxytone rule thus reads as follows:

Oxytone: Place /h/ on the first vowel of the inflectional ending of a word that contains no /h/'s; if there is no inflectional ending, place /h/ on the final vowel of the word.

More formally, the rule will read:

V → [h]	/	# X ] C	—	a)	h
		stem			condition: V ∉ X
		[ # X — C # ]	b)		

If we follow Kiparsky's (1973) "elsewhere convention", the two subparts



a yer. It likewise caused the vocalization of a yer in an immediately preceding syllable: \*pīs-ŭ ---> \*pas. However, in about the 16th century the zero ending of the g.pl. was replaced by an /-a:/ of mysterious origin. Nevertheless, despite the addition of this new ending, there are two respects in which the g.pl. still behaves as if the ending were zero.

First, when the yers dropped they tended to evoke a compensatory lengthening of the preceding vowel in most of the Slavic languages. This is the source of the peculiar rule that lengthens a vowel before the g.pl. ending /-a:/. Originally, the lengthening was caused by the fall of the yer. In contrast to the gen.pl., the lengthening of stem-final vowels in the nom.sg. has been drastically curtailed so that now only a relatively few nouns show this alternation: e.g. mêd, mêda 'honey'. Now if the tendency to abandon lengthening in the nom.sg. arose historically before the addition of the /-a:/ ending, then this differential behavior could be viewed as an effort to distinguish what would otherwise be phonetically identical but morphologically distinct forms of the paradigm. For a similar development in Slovak, see Kenstowicz (1972); also see Greenberg (1969).

Secondly, the nom.sg. and g.pl. are divergent accentually in those stems whose final vowel was a yer. When these stems belong to the oxytone pattern, then in the nom.sg. the á regularly takes the /h/, yielding a rising accent on the preceding syllable if there is one: lòvac from /lovác/, sìnovac from /sinovác/, pàs from /pàs/. But in the gen.pl. most of these nouns display a rather complex alternation: if there is only one vowel preceding the á in the g.pl., then that vowel ends up with a falling accent (cf. lòvācā, skŕtācā, etc.), while if two or more vowels precede the á, then the second vowel preceding the á takes a rising tone (cf. sìnovācā, túdīnācā, stàračācā). In terms of the overall system we have developed, these alternations can be described by simply saying that in the g.pl. the underlying /h/ is deleted from the fleeting vowel. Following Halle (1973), this rule shall be termed Metatony b:

$$\begin{array}{c} \text{h} \\ \text{á} \end{array} \text{ ---> } [-\text{h}] / \text{ --- } C_1 + \text{a:} \\ \text{g.pl.}$$

This rule will be ordered between Tone Spread and Stress. To see how this rule works, examine the following derivations for lòvācā and tùdīnācā.

/#lov#āc-a: #/		/#tudi:n#āc-a: #/		
	h		h	Oxytone
h h		h h h		Tone Spread
-h		-h		Metatony b
<u>o</u>		<u>u</u>		Stress
á:		á:		GPL
-h		-h		Neutralization

This alternation provides some rather striking support for the rules of Tone Spread and Stress developed by Halle. For a system with these rules predicts that, when an /h/ is lost from a medial position within the string of consecutive /h/'s that begin the word, the stress will automatically move two syllables behind the deleted /h/. This is precisely what happens. In terms of any other system that does not employ rules of Tone Spread and Stress, the two syllable jump of accent in forms like tùdīnācā would be quite anomalous.

An even more striking argument in favor of the rule of Tone Spread can be constructed on the basis of a vocalization rule which (optionally for many speakers) turns syllable final l to o. This rule is ordered after Tone Spread. If it applies within a string of /h/'s counting from the beginning of the word, the Halleian system of accent assignment predicts that the stress will be located two syllables to the left of the vocalized l. Forms like the following show this prediction to be true:

žètelac	žèteoca	'reaper'
mòlilac	mòlioca	'petitioner'
stradàlac	stràdaoca/stradálca	'victim'
pogorélac	pogòrioca/pogorélca	'fire victim'
krvopílac	krvòpioca/krvopílca	'blood sucker'
kotàlac	kòtaoca/kotálca	'caldron maker'
stô	stòla	'table'
òrao	órla	'eagle'

Except for the first two items, all these words belong to the oxytone class and hence would normally be expected to show stress on the second

last vowel of the word. But when the l is vocalized internal to the stem, this interrupts the sequence of /h/'s and hence the stress is located two syllables to the left of the vocalized l. If only one syllable precedes, as in stô (i.e. stôo), it takes the stress and has a falling tone. The forms of stradâlac are derived as follows:

/#stradal-#c-#/ h h h ----- a ----- -h	/#stradal-#c-a-#/ h h h h h h stradâo-c-a ----- a ----- -h	/#stradal-#c-a-#/ h h h h h h ----- a ----- -h	Oxytone Tone Spread Vowel Fleet Vocalization Stress other rules Neutralization
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The vocalized o's which cause a displacement of stress of course suggest the possibility of reanalyzing the displacement of stress in the g.pl. along the same lines, i.e. by considering the â as inserted in the g.pl. This approach will be discussed later.

Returning to the masculine nouns, we will now examine the "mobile" pattern. These nouns show the reflex of an alternation between initial and desinential accent. In the masculine nouns there are four different patterns:

- i) rât 'war' (initial accent except for loc.sg.: râtu)
- ii) dêver 'brother-in-law' (initial except for g.pl. which optionally may have desinential accent: devêrâ/dêvêrâ; also deverôvâ/dêverôvâ)
- iii) prîjatelj 'friend' (initial except optionally for oblique pl.: prîjatêljâ/prîjatêljâ, prîjatêljima/prîjatêljima)
- iv) dûb 'oak' (initial in sg., desinential in pl. with Metatony: dûbovi, dûbôvâ, dûbove, dûbovîma)

There is a great deal of fluctuation for this class as regard to which particular sub-pattern any given noun will fall under. Furthermore, most nouns in(ii) and(iii) have alternants with an initial falling accent throughout the paradigm. Finally, whether or not a noun takes desinential accent in the loc.sg. is an independent variable and may crossclassify with any noun in the remaining three patterns. Thus, jêž 'hedgehog' and vâl 'wave' both belong to(iv) yet in the loc.sg. we have jêžu and válu. Similarly, prîjatelj 'friend' and slučâj 'event' belong to (iii), but we have prîjateljû and slučâju/slûčâju. Finally, gôvôr 'speech' belongs

to the same pattern as dêver 'brother-in-law', but one finds govôru/gôvoru vs. dêveru.

Following Halle, I propose to treat these nouns as follows. They will all be basically unaccented and hence receive their desinential accent by Oxytone. Their initial accent will be assigned as follows. In the relevant case forms of the paradigm they will be subject to a special readjustment rule called "Blocking" which will mark them as exceptions to Oxytone. Being underlyingly without accent and failing to receive an /h/ by Oxytone, these words will be unaccented. Their initial accent will now be assigned by the Circumflex rule which simply places an /h/ on the initial vowel of an unaccented word. This rule will of course be ordered after Oxytone and before Stress..

Circumflex:  $V \rightarrow [+h] / \# C_o \_\_\_ X \#$  condition:  $\overset{h}{V} \notin X$

I will assume that the lexical representations of the mobile nouns can be organized in such a fashion that the Blocking rule will apply in the correct case forms of the paradigm. Obviously this accent class requires the most lexical markings, which ties in with the fact that this class is the smallest in number and is subject to much more variation than the acute or oxytone patterns. To show how the rules work, the forms dêver, dêverâ would be derived as follows.

/#dever#/	/#dever-a:#/	
- Ox	-----	Blocking
----	h	Oxytone
----	h h	Tone Spread
h	-----	Circumflex
<u>e</u>	<u>e</u>	Stress
----	e:	GPL

This treatment is supported by the behavior of nouns when prepositions are attached to them. Compare the following forms

b'rât 'brother'	b'râta g.sg.	ôd brata 'from brother'
mêd 'honey'	mêda g.sg.	ôd meda 'from honey'

In the nom. and g.sg. these nouns both have a falling accent, yet b'rât gives a rising accent on the preposition od, while mêd yields a falling accent. The reason for this is that b'rât is acute while mêd is mobile. If we simply say that the preposition is proclitic to the noun and that the Circumflex rule applies to the entire prepositional phrase, the



correct accents are automatically assigned:

/#brát-a#/ <sup>h</sup>	/#od#brát-a#/ <sup>h</sup>	/#med-a#/ <sup>h</sup>	/#od#med-a#/ <sup>h</sup>	
-----	-----	- Ox	-Ox	Block
-----	-----	-----	-----	Oxytone
-----	h	-----	-----	Tone Spread
-----	-----	h	h	Circumflex
<u>a</u>	<u>o</u>	<u>e</u>	<u>o</u>	Stress

This analysis is independently supported by the fact that when the proclitic preposition is polysyllabic, we get a different placement of the accent: pokrāj brata 'alongside brother', but pòkra,j meda 'alongside the honey'.

/#pokra,j#brát-a#/ <sup>h</sup>	/#pokra,j#med-a#/ <sup>h</sup>	
-----	- Ox	Blocking
-----	-----	Oxytone
h h	-----	Tone Spread
<u>a</u>	h	Circumflex
	<u>o</u>	Stress

Before passing on to the other inflectional categories, we must briefly discuss several length alternations. One is a minor rule which lengthens the stem final vowel in the nom.sg. of masculine nouns. This alternation is a reflex of the compensatory lengthening effect of the loss of the yers. As mentioned above, this alternation has remained quite general in the g.pl. (I know of no exceptions), while in the nom.sg. it has steadily been losing ground so that now only a relatively small number of nouns undergo it. Nouns of all accent classes exhibit this alternation:

- acute: jāsēn, jāsena 'ash tree'; pòkōj, pòkoja 'repose'  
 oxytone: vřh, vřha 'summit'; nřtkōv, nřtkova 'scoundrel'  
 mobile: zmāj, zmāja 'dragon'; mēd, mēda 'honey'

These will be described by the following minor rule:

V → V: / \_\_\_\_ C<sub>1</sub>#

The second rule is one which shortens a vowel before the ov morph that is inserted between the stem and the ending in the plural of many monosyllabic and a few polysyllabic masculine nouns.

- glās, glāsa; but glāsōvi, glasōvā/glāsōva 'voice'  
 vřtēz, vřtēza; vřtēzi/vřtezovi, vřtēzā/vřtezōvā 'knight'  
 slūčāj, slūčāja; slūčāji/slūčajeji, slūčājā/slūčajēvā 'event'

bûbanj, bûbnja; bûbnji/bûbnjevi 'drum'

Many of these nouns only optionally take /-ov/ in the plural. When they do not, the underlying length of the stem final vowel is retained. I therefore postulate the following rule of "ov shortening".

V: --- [- long] / \_\_\_ C<sub>1</sub> +ov

This rule too is not without exceptions and for many nouns is optional:

dvôr, dvóra, dvórovi 'palace'

vâl, vâla, válovi 'wave'

grôzd, grôzda, grôzdovi/grôzdovi 'cluster of grapes'

bês, bêsa, bêsi/bêsovi/bêsovi 'fury'

Finally, there is a rule lengthening a vowel before a sonorant (r, l, m, n, j, v) + consonant cluster that has resulted from the loss of a fleeting vowel:

lônac, lónca 'pot'

sânak, sâнка 'sleep, dimin.'

ôrao, ôrla 'eagle'

kâlamek, kâlâmka 'spool'

štôlac, štôlca 'chair'

jârac, jârca 'goat'

ôvas, ôvsa 'oats'

žâlac, žâlca 'snake's tongue'

bôjac, bôjca 'fighter'

čâvao, čâvla 'nail'

krâjac, krâjca 'edge'

At the latest stage of Common Slavic (i.e. just before the loss of the yers) clusters of sonorant plus consonant did not exist, so that when the yers were lost this was the only source for sonorant+consonant clusters. There has been no tendency to extend this lengthening beyond clusters that arise from the loss of a fleeting vowel to sonorant+consonant clusters derived from other sources. In fact, the rule is losing ground so that now many forms with a fleeting vowel fail to show the alternation: mômak, mônka 'young man'; štênac, štênca 'puppy'; mârka, mârākā (g.pl.) 'stamp'.

Turning briefly now to the remaining declensions, it will become apparent that we have developed all of the machinery needed to describe the accentuation of these categories.

The Ib neuter nouns exhibit the three major accentual patterns found in the masculines:

		<u>acute</u>		<u>oxytone</u>		<u>mobile</u>	
Sg.	n, a	sīto	'sifter'	pèro	'pen'	břdo	'hill'
	g	sīta		pèra		břda	
	d,l	sītu		pèru		břdu	
	i	sītom		pèrom		břdom	
Pl.	n,a	sīta		pèra		břda	
	g	sītā		pérā		břdā	
	d,l,i	sītima		pèrima		břdima	
		môre	'sea'	rešèto	'sieve'	mêso	'meat'
		kázalo	'indicator'	krílo	'wing'		
		òrůžje	'arms'	bičálo	'whip'		

Since the g.pl. ending in this declension is /-a:/, all of the nouns show the effect of GPL. Mobile nouns exhibit essentially one pattern of alternation: initial accent in the singular versus desinential accent in the plural. Finally, a very small number of oxytone nouns undergo Metatony in the plural which erases the /h/ from the ending. Thus, 'village' has the following paradigm: sělo, sěla, sělu, sělom in the singular, but sěla, sělā, sělīma in the pl. Other members of this class include bědro 'thigh', rěbro 'rib', sědlo 'saddle', vědro 'pail' and žězlo 'scepter'.

Feminine nouns also show all three accent types:

		<u>acute</u>		<u>oxytone</u>		<u>mobile</u>	
Sg.	n	rība	'fish'	žēna	'wife'	voda	'water'
	g	rībē		žēnē		vodē	
	d,l	rībi		žēni		vōdi	
	a	rību		žēnu		vōdu	
	i	rībōm		žēnōm		vōdōm	
Pl.	n,a	rībe		žēne		vōde	
	g	rībā		žēnā		vódā	
	d,i,l	rībama		žēnama		vōdama	
		řāgoda	'berry'	slobōda	'liberty'	i) glāva	'head', ruka
		škōla	'school'	dūplja	'cave'	'hand', dūša	'soul'

mòlitva 'prayer'

lúdnica 'mental hospital'

ii) gòra 'mountain', ledìna

'wasteland', strána 'side'

Mobile nouns have two slightly different patterns: i) initial accent in both dative and accusative sg., and nom.acc. pl.; ii) initial in acc. sg. and nom.acc. pl. Most of class (i) have alternants in class (ii).

Again the g.pl. gives the most problems in description. Some of the feminine nouns take /-i:/ as the g.pl. ending, borrowed from the i-stems. When this happens there is no lengthening of the preceding stem vowel, nor is the fleeting vowel vocalized. For instance, the nouns sklād̥ba 'composition' and tūžba 'accusation' have the alternant g.pl. forms sklādābā/sklād̥bī and tūžābā/tūžbī. Note that when the ending is /-a:/, we get vocalization of the /d̥/, it is lengthened, and metatony b occurs. When the ending /-i:/ is attached, the /d̥/ does not appear, the stem final vowels are not lengthened, and no metatony takes place. This shows that the rules of GPL and Vowel Fleet are conditioned by the particular morph /-a:/.

Just as in the masculine nouns, so too in the feminine nouns there are exceptions to Metatony b:

tórba, torábā 'sack'

jézgra, jēzgāra/jezgārā 'nucleus, core'

sēstra, sestārā 'sister'

mētla, metālā 'broom'

I will now return to the question of whether the a-ø in the g.pl. can be interpreted as insertion instead of deletion. An insertion analysis is particularly attractive because it permits a "rational" explanation for the otherwise "phonetically/phonologically" peculiar metatony b alternation. If the rule inserting a is ordered after Tone Spread and before Stress, then the displacement of accent follows automatically from the general system of accent assignment developed in this paper. For example, the g.pl. forms sklādābā and kōnverātā (cf. sklād̥ba 'composition' and kōnvērta 'envelop') would be derived as follows:

/#skladb-a:#/	/#konvert-a:#/	
h	h	Oxytone
h	h h	Tone Spread
h <sup>h</sup> skladb-a:	h <sup>h</sup> konvert-a:	Insertion
<u>a</u>	<u>o</u>	Stress
a:	a:	GPL
	-h	Neutralization

To claim that the a- $\phi$  alternation has been reanalyzed as insertion is to claim that "rule inversion" in the sense of Vennemann (1972) has taken place, because historically the a goes back to a yer which was vocalized by the g.pl. ending, which also was a yer: i.e. pas(ā) < \*pīs-ŭ 'of the dogs'. There are several pieces of evidence that support this claim of rule inversion. First, note that in the feminine and neuter inflectional classes the vocalized yer appears in only one "marginal" case form in the entire paradigm. Taking  $\phi$  as basic would conform to the tendencies for the most frequent allomorph or the allomorph appearing in unmarked cases to be interpreted as basic, tendencies which Vennemann claims to control most cases of rule inversion. Secondly, in the four centuries intervening between the fall of the yers and the addition of the /-a:/ g.pl. ending, the a of the a- $\phi$  appeared in a context that was particularly prone to being analyzed as an inserted vowel: between two consonants in word-final position. Finally, there is independent evidence that after the fall of the yers a rule entered SC (as well as most of the other Slavic languages) which broke up certain final consonant clusters. In SC essentially all final clusters except those consisting of a coronal stop + coronal spirant were broken by the insertion of an a. This is proved by the fact that we find a's appearing in forms that never contained a yer historically: e.g. òganj, ògnja 'fire' goes back to the root ogn-. Its nom.sg. form in Proto-Slavic was \*ogn-ī, cf. OCS ognj. After the fall of the final yer we should have obtained ognj. Instead, its final cluster was lightened by the insertion of an a. Similarly, the g.pl. of sèstra 'sister' was sestr-ŭ in Proto-Slavic and OCS. It should have yielded sestr In SC. Instead we find sestarā < \*sestar. In addition, borrowings were modified to agree with the final cluster requirements: cf. momènat, momènta 'moment'; insekat, insekta 'insect'; sèkunādā, g.pl. of sekūnda 'second'; etc. More recently,

however, the epenthesis rule has ceased to be a phonetic principle of the language and new borrowings are not modified: t`ānk 'tank', `ākt 'act', p`ark 'park', jōgurt 'yogurt'.

Now granting that epenthesis of a was a rule at one time in the development of SC, it is reasonable to suppose that the a-ø in forms like sklāḍba, which goes back to a yer etymologically and hence involved deletion, was reanalyzed as insertion: the ǰ would only show up in the g.pl. of the feminine and neuter declension, exactly the environment in which the historical epenthesis operated. If the a-ø alternation in forms like sklāḍba were reanalyzed as insertion, this would then lead to a generalization of the metatony b alternation and provide a "rational" explanation for it.

Although this account of the origin of the metatony b alternation in the g.pl. strikes me as quite reasonable diachronically, it is clear that synchronically the metatony b alternation has been reinterpreted in the form of the Metatony b rule originally proposed by Halle for Russian. There are two reasons, one fairly weak, but the other is quite compelling. First, as noted above, there are exceptions to the alternation: cf. tóṛba, torábā 'sack'. In order to account for the alternation of sklāḍbā, kōnverātā in terms of Insertion after Tone Spread, it would be necessary to order Insertion before Tone Spread for torábā; and for forms like jēzgārā/jezgārā 'nucleus' which show both alternatives, it would be necessary to permit the rules to apply optionally in different orders. To the extent that one objects to having different orderings of the same pair of rules in the grammar, these exceptions can be taken as evidence against the insertion explanation for metatony b synchronically. A much better reason (if the first is a reason at all) is that the connection between insertion and metatony b has been broken. There are now quite a few forms where the metatony b alternation has been extended to vowels other than /ǰ/'s. These are found in all inflectional categories:

masc.:	jēlen	jēlēnā	'deer'
	gōlūb	golubōvā/gōlubōvā	'pigeon'
	vītēz	vitezōvā/vitezōvā	'knight'
neuter:	gōvedo	gōvēdā	'cattle'

Femin.:	država	držāvā	'country'
	kōbila	kōbīlā	'mare'
	věčera	vēcērā	'supper'

It is clear that to account for these forms will require a rule of the following form:

Metatony b V  $\rightarrow$  [- h] / \_\_\_\_ C<sub>1</sub> + a:  
[g.pl.]

This will of course have to be a minor rule applying to only a restricted class of forms that will have to be listed in the lexicon.

The vast majority of i-stem nouns are acute, having the same accent on the same syllable throughout the paradigm. There are no oxytone nouns in this declension. The mobile pattern occurs in two sub-types: i) initial accent except for the oblique pl.; ii) initial accent except for the g.pl. And cross-cutting the latter two categories is desinential versus initial accent in the loc.sg.

		<u>acute</u>				
Sg	n,a	ávet	'ghost'	kōst	'bone'	sm̃t 'death'
	g,d	áveti		kōsti		sm̃ti
	i	áveti		kōsti		sm̃ti
	l	ávetu		kōsti/kōsti		sm̃ti
Pl	n,a	áveti		kōsti		sm̃ti
	g	ávetī		kōstī		sm̃tī
	d,i,l	ávetimi		kōstima		sm̃tima
		ljúbav	'love'	stvár	'thing'	mēd 'copper'
		zābīt	'remote place'	bōlēst	'illness'	
		dīčnōst	'wildness'	pāmēt	'mind'	

The acute nouns will be provided with an underlying /h/ in the lexicon exempting them from any further rules. The mobiles will be unaccented and will receive a desinential accent by Oxytone. In the required cases they will be subject to the Blocking readjustment rule which will exempt them from Oxytone, in which case they will receive an initial accent via the Circumflex rule.

Before ending this report there is one more bit of evidence bearing on the analysis of SC accents that must be discussed. As we have seen, the most unique and controversial aspect of Halle's analysis is the rule of Tone Spread. I have presented two pieces of evidence --

the i-vocalization and a-insertion rules -- that strongly suggest that at least historically SC passed through a stage in which the language possessed the tone spreading phenomenon. There is one further rule of vowel insertion that bears on this hypothesis -- the "diphthongization" of the Proto-Slavic yat', a tense non-high front vowel which derives from PIE \*e, ai, and oi. The yat' has three outcomes in SC: in the eastern ekavskij dialects it becomes e(:), in the western ikavskij dialects its reflex is i(:), while in the southern jekavskij area it appears as je when it was short and iје when long. Phonetically, the iје sequence is two syllables.

<u>PS</u>	<u>ekavskij</u>	<u>ikavskij</u>	<u>jekavskij</u>	
* <u>dědŭ</u>	<u>děd</u>	<u>đid</u>	<u>djěd</u>	'grandfather'
* <u>svědokŭ</u>	<u>svědok</u>	<u>svīdok</u>	<u>svjědok</u>	'witness'
* <u>rěka</u>	<u>rěka</u>	<u>rīka</u>	<u>rijěka</u>	'river'
* <u>lěpŭ</u>	<u>lěp</u>	<u>līp</u>	<u>lījep</u>	'beautiful'

As is evident from these examples, where there is a long rising accent on the historical yat' in ekavian and ikavian, we find a short rising accent on the second element of the "diphthong" (cf. rijěka), while a long falling accent yields a short falling accent on the initial member of the iје sequence (cf. lījep).

The problem is to explain the accentual outcomes of the yat' in terms of the system developed earlier. If diphthongization is ordered before Stress and formulated so that both syllables of the diphthong maintain an /h/ (i.e. as h: --> h<sup>h</sup>h<sup>h</sup>), then it incorrectly predicts that lěp from /l<sup>h</sup>ě:p/ should appear as lījep. In order to derive lījep it appears that the e must be /-h/. We might therefore try to reformulate the rule to read h: --> h<sup>h</sup>i<sup>-h</sup>je. But this incorrectly predicts that not only will rěka from /r<sup>h</sup>ě:kă/ become rijeka (</ri<sup>h</sup>je<sup>h</sup>kă/), but also that poměsati 'to mix' will become \*pōmīješati instead of the correct pomīješati.

So far we have just looked at cases where the yat' was the stressed vowel. Forms in which it was the rightmost vowel bearing the underlying /h/ add further complications. Consider the following:

<u>ekavian</u>	<u>jekavian</u>	
océniti	ocijèniti	'to appraise'
òcēnjen	òcijenjen	'appraised'



océpiti	ocijèpiti	'to graft'
ôcēpljen	ôcijepljen	'grafted'

In these verbal forms the underlying /h/ is one the final syllable of the stem /oce:n<sup>h</sup>i-/ and /oce:p<sup>h</sup>i-/. Before the infinitive suffix nothing happens to the stem and the expected accent results. But when the participial suffix /-en/ is added to the stem, the stem-final -i<sup>h</sup> is glided to j losing its /h/, so that the last /h/ now appears on the preceding root vowel. Note that in both dialects the stress appears on the o. This demonstrates that as far as the placement of stress is concerned, the ije sequence still counts as a single syllable in the jekavian dialect. We can achieve this effect by ordering diphthongization after Stress:

/#oce:p <sup>h</sup> i-en#/	
h h	Tone Spread
h <sup>h</sup> h	
ôcē:plj-en	other rules
<u>o</u>	Stress
<u>h</u> h	
ôcijēplj-en	Diphthongization

But if Diphthongization is ordered after Stress for forms like these, then we must invoke auxiliary principles to explain the forms like rijēka and lijep, which after Stress would appear as /#rē:kā<sup>h</sup>/ and /#lē:p<sup>h</sup>/. The problem thus is to explain why, when a stressed /ē:/ followed by an /h/ is diphthongized to ije, the stress appears on the second syllable, whereas if the /ē:/ is not followed by an /h/, the stress appears on the initial syllable of the diphthong.

This can be explained along the following lines. First, when a stressed syllable breaks in to two syllables, it is natural for the stress to come to be associated with just one of the two new syllables because of the universal tendency to avoid adjacent stressed syllables. Second, recall that the phonetic investigations of Lehiste and Ivič (1963) showed that syllables marked by the /ˈ/ accent have a high FF on the initial quarter followed by a fall to a rather low FF, while those marked by /ˌ/ had a rising contour. If long syllables are translated into moras, these facts can be represented as follows: ē = h e and é = e h e where underlining again represents stress. When these long syllables break into two syllables, we find that the stress appears on the syllable which preserves the underlying /h/: e e → i<sup>h</sup> e and

$\underline{e} \xrightarrow{h} i \underline{e}^h$ . In other words, the stress migrates to that portion of the broken syllable which has the highest pitch -- the expected outcome.

Thus, although the breaking of the yat' does not provide any new evidence that supports the Tone Spreading rule (since it is ordered after Stress), it does not provide any counter-evidence either. Furthermore, it can be plausibly explained by auxiliary principles.

#### FOOTNOTES

<sup>1</sup>See Magner and Matejka (1971) for discussion. These scholars point out that the Vukovian system is an archaic norm which, although taught in the schools, is not perceived by the majority of speakers of contemporary Serbo-Croatian. This conclusion is based upon extensive listening tests in which subjects (mostly high school students) were asked to distinguish between utterances that form minimal pairs in the Vukovian norm. In most cases the speakers failed to make the required distinctions, especially in the case of differences in tone. Although this study is obviously of great importance, it would have been still more interesting if Magner and Matejka had performed acoustic analyses of the speech of some of their subjects to determine the extent to which aspects of the Vukovian norm are present or absent. For Labov (1972) has shown that speakers may fail to perceive differences which they in fact make in their own speech.

<sup>2</sup>DeBray (1969:318) makes the following remark: "Vondrák has pointed out that  $\sim$  sounds stronger and more abrupt than  $\sim$ , which later, as also the  $\sim$ , cause the next syllable quite naturally to be higher in pitch and more smoothly connected."

<sup>3</sup>In roughly the 15th century the accent in Štokavian was retracted one syllable to the left. Compare the following SC words with their cognates in Russian, which in general has preserved the position of the Proto-Slavic accent: R sub'ota, SC sùbota 'Saturday'; R prostot'a, SC prostòta 'simplicity'.

<sup>4</sup>It is interesting that in all of the Slavic languages undergoing this epenthesis, the epenthetic vowel is always identical to the reflex of the yers: thus, in West Slavic, where the yers developed into e, the epenthetic vowel is e; in East Slavic the yers changed e or o depending upon the nature of the adjacent consonants and the inserted vowel is e/o whose quality similarly depends upon adjacent consonants.

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A CASE OF SYSTEMATIC AVOIDANCE OF HOMONYMS

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In this paper -- which represents the third report on our on-going research into the phonological and grammatical structure of Chi-Mwi:ni, a Bantu language spoken in the city of Brava (-Mwi:ni) in Somalia (cf. Kisseberth and Abasheikh, to appear) -- we will give a detailed account of the phonology of the so-called "applied" stem,<sup>1</sup> focusing in particular on problems relating to the ways in which such stems form a past tense. We will attempt to demonstrate that avoidance of homonyms plays a systematic role in determining how an applied stem will form its past tense, and that as a consequence the rules that derive past tense forms of applied stems must be transderivational in nature.<sup>2</sup> Since Chi-Mwi:ni is still largely undescribed at the present time, we will include a considerable amount of illustrative material to support the principles that are claimed to operate in the language.

We take the underlying shape of the applied suffix to be -iɪ-. The consonant ɪ is one of three liquids in the language: ɪ, l, and r. Preliminary instrumental investigation indicates that ɪ differs from l (with which it is frequently in morphophonemic alternation, as we will see below) in several respects: in the articulation of ɪ, the tongue tip strikes lightly in a small area to the front of the alveolar ridge, whereas the articulation of l shows a wider area of contact; ɪ is substantially shorter in duration than l; there is lateral contact for l, but not for ɪ.

The applied suffix -iɪ- has the morphophonemic variants -eɪ-, -il-, and -el-. The distribution of these variants is governed by principles that have at least somewhat wider scope of application than just the applied suffix itself. First of all, the mid-vowel variants occur after stems whose last vowel is mid, that is, either e or o. This principle of Vowel Harmony, attested in many Bantu languages, affects suffixes such as the causative -ish-, the stative/potential -ik-, the past -i:ɪ-, as well

as others. In (1) we give examples of cases where the underlying high vowel of the applied suffix is retained after stems whose last vowel is i, u, or a (long and short); in (2) we give examples where the vowel of -iɪ- lowers to e after stems whose last vowel is e or o (long and short).

- (1) x-kun-a 'to scratch' x-kun-iɪ-a<sup>3</sup>  
 ku-vu:t-a 'to pull' ku-vu:t-iɪ-a  
 ku-zu:b-a 'to roll (thread, rope)' ku-zu:b-iɪ-a  
 xudum-a 'to serve s.o.' xudum-iɪ-a  
 x-pik-a 'to cook' x-pik-iɪ-a  
 ku-ziw-a 'to fill a hole, crack' ku-ziw-iɪ-a  
 ku-wi:nd-a 'to hunt (animals)' ku-wi:nd-iɪ-a  
 x-pit-a 'to pass' x-pit-iɪ-a  
 x-pat-a 'to get' x-pat-iɪ-a  
 ku-wak-a 'to build' ku-wak-iɪ-a  
 x-ta:nd-a 'to spread s.t. out' x-ta:nd-iɪ-a  
 ku-waɬa:ŋg-a 'to count' ku-waɬa:ŋg-iɪ-a
- (2) x-ko:mb-a 'to lick' x-ko:mb-eɪ-a  
 x-po:nd-a 'to pulverize' x-po:nd-eɪ-a  
 x-to:ŋg-a 'to provoke' x-to:ŋg-eɪ-a  
 x-shom-a 'to sew' x-shom-eɪ-a  
 ku-we:k-a 'to put' ku-we:k-eɪ-a  
 x-te:nd-a 'to act' x-te:nd-eɪ-a  
 ku-ɬe:t-a 'to bring' ku-ɬe:t-eɪ-a  
 x-fedeh-a 'to reveal s.o.'s wrongdoings' x-fedeh-eɪ-a

If the stem preceding the applied suffix ends in a liquid, the i of the applied suffix changes to l. This same phenomenon is observed in past tense formation, where the past suffix -i:ɪ- also changes its consonant to l after stems ending in l, ɪ, or r. This alternation is not a "phonetic" rule -- one can find the consonant occurring after a liquid in words such as ku-ɬa:ɪ-a 'to sleep', ku-la:ɪ-a 'to be sick', ku-ɬe:ɪ-a 'to be loose', ku-ɬu:ɪ-a 'to wear out', ɬe:ɬo 'today'. Nevertheless, the rule is very regular in that the i of both the applied and the past suffixes invariably changes to l after stems ending in a liquid. There

are no exceptions to this principle in the rather extensive materials we have gathered so far in our research. Some examples:

- (3) ku-gu:r-a 'to move' ku-gu:r-il-a (applied) gur-i:l-e (past)  
 x-fasir-a 'to translate' x-fasir-il-a (applied) fasir-i:l-e (past)  
 ku-dho:r-a 'to guard, protect' ku-dho:r-el-a (applied)  
 dhor-e:l-e (past)  
 x-su:l-a 'to want' x-su:l-il-a (applied) sul-i:l-e (past)  
 x-kil-a 'to step over' x-kil-il-a (applied) kil-i:l-e (past)  
 x-komel-a 'to lock' x-komel-el-a (applied) komel-e:l-e (past)

In (3) we give examples where the applied suffix and the past suffix follow stems ending in r and l. We claimed above, however, that the change of *ɪ* to *l* in the applied and past suffixes also occurs after the third liquid, *ɪ*. This is not immediately apparent when we consider examples such as those in (4):

- (4) x-ku:ɪ-a 'to extract' x-ku:l-il-a (applied) ku:z-ɪɪ-e (past)  
 ku-mo:ɪ-a 'to shave' ku-mo:l-el-a (applied) mo:z-eɪ-e (past)  
 x-pe:ɪ-a 'to sweep' x-pe:l-el-a (applied) pe:z-eɪ-e (past)  
 x-paɪ-a 'to scratch' x-pal-il-a (applied) paz-ɪɪ-e (past)

The data in (4) reveal two facts. First, a stem-final *ɪ* is converted to *l* when it precedes the applied suffix. For convenience, let us refer to this principle as Pre-applied Lateralization. As a consequence of Pre-applied Lateralization it is impossible to determine from these forms whether the *ɪ* of the applied suffix is changing to *l* due to the fact that it is preceded by a stem ending (underlyingly) in *ɪ* or to the fact that it is preceded by a stem ending (after Pre-applied Lateralization) in *l*. That is, the data in (4) would be consistent with the claim that just *l* and *r* trigger a change of *ɪ* in the past and applied suffixes to *l* (call this rule simply Lateralization), provided Pre-applied Lateralization is ordered prior to Lateralization. A second point revealed by (4) is that a stem-final *ɪ* is converted to *z* before the past tense suffix. This is one part of a very general scheme of consonantal mutations before the past suffix, described in detail in Kisseberth and Abasheikh (to appear). Since the stem-final *ɪ* is converted to *z*, the *ɪ* of the past suffix escapes Laterlization. But since these *ɪ*'s change to *z*, we cannot tell whether or not they

do condition Lateralization.

The question of whether ɬ should be included in the set of consonants triggering Laterlization can be answered, thanks to the existence of a small number of words that have escaped the effects of both Pre-applied Lateralization and Lateralization. Note the examples in (5):

- (5) qa:tiɬ-a 'to kill' qatiɬ-il-a (applied) qatiɬ-i:l-e (past)  
 x-sajii-a 'to record' x-sajii-il-a (applied) sajii-i:l-e (past)  
 x-tana:zuɬ-a 'to renounce, forsake' x-tana:zuɬ-il-a (applied)  
 tanazuɬ-i:l-e (past)

It can be readily observed from (5) that both the applied suffix and the past suffix change their ɬ to l after the above stems. These stems, which are exceptions both to Pre-applied Lateralization and to the mutation of ɬ to z before the past suffix, will be discussed in further detail later, where they will play a crucial role in the argument concerning the avoidance of homonyms. We conclude from (5), then, that Lateralization is conditioned by all three liquids, ɬ as well as l and r.

In addition to the four shapes so far discussed (-iɬ-, -eɬ-, -il-, and -el-), the applied suffix also occurs in what we will refer to as an "extended" form -iiɬ- (-eɬez-). This extended form appears after stems ending in the consonants s, sh, ñ, and z (though the situation regarding z is more complicated, and will be discussed in detail below). The data in (6) exemplify the occurrence of the extended form of the applied suffix after stems ending in s, sh, and ñ.

- (6) x-pas-a 'to borrow, to lend' x-pas-iiɬ-a  
 ku-bu:s-a 'to kiss' ku-bus-iiɬ-a  
 x-tokos-a 'to boil' x-tokos-eɬez-a  
 k-u:sh-a 'to hide s.t.' k-ush-iiɬ-a  
 x-tosh-a 'to suffice' x-tosh-eɬez-a  
 ku-barsh-a 'to teach' ku-barsh-iiɬ-a  
 x-ta:wañ-a 'to spill (intrans.)' x-tawañ-iiɬ-a  
 x-fa:ñ-a 'to do, to make' x-fañ-iiɬ-a  
 k-a:wañ-a 'to divide' k-awañ-iiɬ-a



The extended form of the applied suffix occurs after stem-final *z* as well, but this occurs regularly only when the *z* is preceded by a consonant (in the data so far collected, the consonant is always a nasal). Examples:

- (7) *k-a:nz-a* 'to begin'    *k-anz-iiz-a*  
       *x-ko:nz-a* (the causative form of *x-ko:mb-a* 'to lick') *x-konz-eiez-a*  
       *x-pa:nz-a* (the causative form of *x-pa:nd-a* 'to rise') *x-panz-iiz-a*

Stems ending in ...*Vz-*, however, do not have the shape ...*Vz-iiz-* but rather ...*Vliz-*. For example, *k-u:z-a* 'to ask' has the applied form *k-u:iz-a* and not \**k-uz-iiz-a* and also not \**k-u:z-iz-a*. Additional examples illustrating this point:

- (8) *x-tez-a* 'to play'    *x-teiez-a*  
       *x-timiz-a* 'to complete'    *x-timiiiz-a*  
       *x-pu:nguz-a* 'to decrease s.t.'    *x-punguliz-a*  
       *k-o:ioz-a* (the causative form of *k-o:low-a* 'to get wet') *k-oioiez-a*  
       *x-ta:iaz-a* 'to spread s.t.'    *x-taiaiz-a*

Forms such as those in (8) can be described in at least two ways. The first analysis would derive an applied stem such as *-u:iz-* from /*u:z-iiz-*/ by eliding the final *z* of the root *-u:z-* and the first vowel of the suffix *-iiz-*. Given this analysis, stems ending in *z* would take the extended form of the applied suffix in all contexts, but would omit their final *z* and the first vowel of the applied suffix except in cases like (7) where a (nasal) consonant precedes the *z*. The second analysis would derive *-u:iz-* from /*u:z-iz-*/ by a rule that would metathesize the stem-final *z* and the *i* of the applied suffix. Given this analysis, it would be necessary to require that stems ending in ...*Vz-* add the non-extended form of the applied suffix, namely *-iz-*, whereas stems ending in ....*nz-* add the extended form *-iiz-*. In addition, a rule of Metathesis would apply to exchange the final *z* of a ...*Vz-* stem with the *i* of the following applied suffix. Let us call the first analysis the Elision solution and the second analysis the Metathesis solution. There is no strong evidence favoring one of these solutions over the other. There is, however, one piece of evidence that might be taken to support the Elision

solution. We have found one stem ending in ...Vz- that does not follow the regular pattern: x-fu:z-a 'to succeed; to pass (an exam)', which has the applied stem x-fuz-iiz-a rather than the expected \*x-fu:iiz-a (it may be relevant that there is a verb in Chi-Mwi:ni x-fu:iiz-a 'to frequent a place'). Given the Metathesis solution to the data in (8), it would be necessary to assume that -fu:z- not only exceptionally fails to undergo the metathesis of stem-final z with the i of the applied suffix, but also irregularly adds the extended form of the applied suffix -iiz- rather than the non-extended form -ii-. Given the Elision solution, on the other hand, -fu:z- is simply an exception to the elision. x-fuz-iiz-a suggests that stems ending in z should be treated as regularly taking the extended form of the applied suffix, with stems ending in ...Vz- then undergoing the additional process of Elision.

We have now given a complete description of the regular features of the formation of the applied stem. In the remainder of this paper we will be concerned with the description of how an applied stem forms a past tense. First of all, it will be necessary to survey briefly the rather complex rules of past tense formation discussed in Kisseberth and Abasheikh (to appear); obviously, we cannot document fully here the data supporting the stated principles, but can only summarize the results of the extensive investigation reported on in the paper cited above.

We assume here that the basic shape of the past suffix is -i:i-. This suffix undergoes a number of changes and also conditions changes in the preceding stem-final consonant. We list the changes involved below, with a few examples to illustrate each.

- (9) (a) i of the past suffix changes to l after stems ending in a liquid; this is just the rule of Laterlaization discussed earlier in the paper. Examples have already been given.
- (b) i of the past suffix changes to z after stems ending in s, z, sh, and ñ; e.g., -fa:ñ- 'to do, to make' has the past form fañ-i:z-e, -barsh- 'to teach' has the past form barsh-i:z-e, etc.
- (c) Stem-final p, t, and t change to s and stem-final k changes to sh before the past suffix; the resulting s and sh do not condition (b) above. Examples: ku-ii-p-a 'to pay', iis-ii-e; ku-lat-a 'to let go', las-ii-e; ku-io:t-a 'to dream', io:s-ei-e; x-tek-a 'to laugh', tesh-ei-e.

- (d) Stem-final *i* changes to *z* before the past suffix; the resulting *z* does not trigger (b) above. Furthermore, the *i* of the suffix escapes (a) above. In terms of rule ordering, (b) must be applied before (d) and (d) must be applied before (a). Examples: see (4).
- (e) Stem-final *b*, *d*, *d*, and *g*, if preceded by a nasal, change to *z* before the past suffix. Again, the resulting *z* does not trigger (b) above. Examples: *ku-iō:mb-a* 'to beg', *iō:nz-ei-e*; *x-pe:nd-a* 'to like', *pe:nz-ei-e*; *x-po:nd-a* 'to pulverize', *po:nz-ei-e*; *x-fu:ng-a* 'to close', *fu:nz-ii-e*.
- (f) The long vowel of the past suffix is shortened if preceded by a "mutated" consonant, where a mutated consonant is one that has undergone one of the rules listed as (c), (d), and (e).

(9) correctly predicts the past tense forms of all regular non-derived verb stems as well as certain classes of derived stems (e.g. the causative stem formed by *-ish-*, the stative/potential stem formed by *-ik-*). There are, however, a few irregular non-derived stems and certain classes of derived stems that undergo an alternate pattern of past-tense formation, a pattern that we will refer to as Ablaut. Ablaut involves changing the final vowel of a verb stem in the manner set forth in the following table:

<i>i(:)</i>	→	<i>i</i>
<i>e(:)</i>	→	<i>e</i>
<i>a(:)</i>	→	<i>e</i>
<i>o(:)</i>	→	<i>e</i>
<i>u(:)</i>	→	<i>i</i>

To illustrate the Ablaut pattern of past tense formation, we can cite first of all some of those non-derived stems which exceptionally undergo Ablaut:

(10) <i>ku-won-a</i>	'to see'	<i>we:n-e</i>
<i>x-pat-a</i>	'to get'	<i>pe:t-e</i>
<i>x-sa:i-a</i>	'to remain'	<i>-se:i-e</i>
<i>k-i:z-a</i>	'to refuse'	<i>i:z-e</i>
<i>ku-ia:i-a</i>	'to sleep'	<i>ie:i-e</i>

Among the derivational affixes which regularly undergo Ablaut we find the reciprocal *-an-*, the verb-forming suffix *-at-* (employed primarily with

Somali and Arabic loanwords), the transitive suffix -uɪ-. Examples of these suffixes are given in (11):

- (11) ku-da:r-a 'to touch' ku-da:r-an-a 'to touch one another'  
       wa-dar-e:n-e 'they touched one another'  
       ku-big-a 'to hit' ku-big-an-a 'to hit one another'  
       wa-big-e:n-e 'they hit one another'  
       x-fo:f-at-a 'to go to graze' fof-e:t-e  
       ku-duma:i-at-a 'to marry the widow of one's brother' dumai-e:t-e  
       x-fufun-uk-a 'to be clear, intelligible' x-fufun-uɪ-a 'to  
       explain, uncover' fufun-i:i-e  
       k-o:nd-ok-a 'to wake up' k-o:nd-oɪ-a 'to wake s.o. up'  
       ond-e:i-e

With the above background on regular past-formation and Ablaut past-formation in Chi-Mwi:ni, we can now turn to an examination of past tense formation as it affects applied stems. The regular method of forming the past of an applied stem is illustrated by the examples in (12):

- (12) x-su:k-a 'to plait' su:sh-iɪ-e  
       x-su:k-iɪ-a (applied) suk-il-i:l-e  
       x-ko:d-a 'to talk' kod-e:i-e  
       x-ko:d-eɪ-a (applied) kod-el-e:l-e  
       k-o:f-at-a 'to be tired' of-e:t-e  
       k-of-at-iɪ-a (applied) of-at-il-i:l-e  
       x-kom-a 'to reach, arrive' kom-e:i-e  
       x-kom-eɪ-a (applied) kom-el-e:l-e  
       x-tu:ng-a 'to tend animals; to sift' tu:nz-iɪ-e  
       x-tu:ng-iɪ-a (applied) tu:ng-il-i:l-e  
       x-kokot-a 'to drag (on the ground)' kokos-eɪ-e  
       x-kokot-eɪ-a (applied) kokot-el-e:l-e  
       x-so:m-a 'to read' scm-e:i-e  
       x-so:m-eɪ-a (applied) scm-el-e:l-e  
       x-pa:nd-a 'to climb, rise' pa:nz-iɪ-e  
       x-pa:nd-iɪ-a (applied) pand-il-i:l-e  
       ku-re:b-a 'to forbid, stop' reb-e:i-e  
       ku-re:b-eɪ-a (applied) reb-el-e:l-e

A consideration of the data in (12) reveals that the past suffix i is converted to l after the applied suffix: this change is, of course, simply the rule of Lateralization discussed earlier. Furthermore, the i

of the applied suffix is itself converted to *l* when the past suffix follows. It is possible that this change is to be connected up with the phenomenon referred to earlier as Pre-applied Lateralization: that is, perhaps it could be claimed that a stem-final *ɬ* is regularly changed to *l* not only before the applied suffix, but also before the past suffix. The problem of course is that ordinarily stem-final *ɬ* changes to *z* before the past suffix. It is only the *ɬ* of the applied suffix that regularly changes to *l* before the past suffix. Consequently, we will leave the question open as to whether the change of the *ɬ* of the applied suffix to *l* before the past suffix is to be equated in any way with the regular change of stem-final *ɬ* to *l* before the applied suffix.

The data in (12) demonstrate that the applied suffix *-iɬ-* regularly requires the suffixed past tense form. The extended applied suffix *-iɬiz-*, on the other hand, regularly takes the Ablaut past formation.

(13) gives some relevant examples:

(13) ku-bu:s-a	ku-bus-iɬiz-a	bus-iɬi:z-e
x-tosh-a	x-tosh-eɛez-a	tosh-eɛe:z-e
x-fa:ñ-a	x-fañ-iɬiz-a	fañ-iɬi:z-e
x-pa:nz-a	x-panz-iɬiz-a	panz-iɬi:z-e

It should be pointed out that even those stems ending in ...Vz-, and thus undergo either Elision or Metathesis (depending on the analysis chosen), take the Ablaut pattern of past tense formation:

(14) x-tez-a	x-teɛez-a	teɛe:z-e
k-o:ɬoz-a	k-oɬoɛez-a	oɬoɛe:z-e
x-ta:ɬaz-a	x-taɬaɬiz-a	taɬaɬi:z-e

This observation further identifies forms like those in (14) with the extended form of the applied suffix, and thus may be considered to give some additional support to the Elision analysis of examples like x-teɛez-a which would derive it from the more remote structure /x-tez-eɛez-a/. Given the Elision analysis, the fact that the stem *-teɛez-* takes an Ablaut past would simply be a consequence of the fact that the extended applied suffix *-iɬiz-* takes an Ablaut past.

Although the preceding remarks will account for the great bulk of the past tense forms of applied stems, certain interesting problems remain. Consider the data in (15) below.

- (15) ku-mo:i-a 'to shave' mo:z-ei-e  
 ku-mo:l-el-a (applied) mol-e:l-e  
 x-pe:i-a 'to sweep' pe:z-ei-e  
 x-pe:l-el-a (applied) pel-e:l-e  
 x-ta:i-a 'to take s.t.' te:t-e [irregular past form]  
 x-ta:l-il-a (applied) tal-i:l-e  
 x-so:i-a 'to crush grain' so:z-ei-e  
 x-so:l-el-a (applied) sol-e:l-e  
 ku-ia:i-a 'to sleep' ie:i-e [irregular Ablaut past form]  
 ku-ia:l-il-a (applied) ial-i:l-e  
 x-ku:i-a 'to extract s.t.' ku:z-i-i-e  
 x-ku:l-il-a (applied) kul-i:l-e  
 x-pu:u-a 'to shell corn' pu:i:i-e [Ablaut past]  
 x-pu:ul-il-a (applied) pu:ul-i:l-e  
 k-o:ioi-a 'to straighten' oie:i-e [Ablaut past]  
 k-oiol-el-a (applied) oiol-e:l-e  
 x-pa:ngu-a 'to cancel, erase' pangi:i-e  
 x-pangul-il-a (applied) pangul-i:l-e

The past tense of the applied stems listed in (15) all follow the Ablaut pattern. That is, the past of the applied stem mo:l-el- (from /mo:i-i/ underlyingly) is mol-e:l-e rather than \*mol-el-e:l-e. The latter, incorrect form would be the result of adding the past suffix to the applied stem mo:l-el-. The correct form is obtained by simply applying the Ablaut principle to the applied stem.

Notice that in (15) the applied stem has the surface form ...l+<sup>{i}</sup><sub>{e}</sub>l-, though the underlying source is ...i+<sup>{i}</sup><sub>{e}</sub>i-. It can be readily observed that these applied stems behave differently from those in (16), where the surface form of the applied stem is again ...l+<sup>{i}</sup><sub>{e}</sub>l-, but where the underlying source is ...l+<sup>{i}</sup><sub>{e}</sub>i-.

- (16) x-su:l-a 'to want' sul-i:l-e  
 x-su:l-il-a (applied) sul-il-i:l-e  
 x-kal-a 'to press' kal-i:l-e  
 x-kal-il-a (applied) kal-il-i:l-e  
 x-kil-a 'to step over' kil-i:l-e  
 x-kil-il-a (applied) kil-il-i:l-e  
 ku-ia:ngal-a 'to look at' ia:ngal-i:l-e  
 ku-ia:ngal-il-a (applied) ia:ngal-il-i:l-e  
 x-komel-a 'to look' komel-e:l-e  
 x-komel-el-a (applied) komel-el-e:l-e

The applied stems in (16) do not undergo the Ablaut pattern of past tense formation, but rather add the past tense suffix.

At first glance it might appear that the best way to account for the difference between (15) and (16) is to say that if the applied suffix is added to a stem ending in *i*, then the entire stem forms its past by Ablaut; if the applied suffix is added to a stem ending in other consonants (including *l*), the resulting applied stem forms its past by the regular suffixation process. This analysis gives no explanation for why stems ending in *i* should cause the applied suffix to undergo Ablaut, whereas stems ending in other consonants cause the applied suffix to take a suffixed form of the past tense.

Let us consider the following alternative account of the data in (15) and (16). Suppose that we claimed that if the applied suffix is added to a stem ending in *l* or *i*, the regular methods of forming the past tense will be Ablaut. However, if application of the Ablaut principle would result in a past tense form of the applied suffix that is identical to the past tense of the corresponding non-applied verb stem, then the suffixation pattern of past tense formation must be adopted. In other words, the language basically would like to avoid adding the past suffix *-i:i-* to an applied stem where the applied suffix *-i:i-* has been added to a stem ending in *l* or *i*; in order to avoid adding the past suffix, Ablaut is applied. But at the same time the language wishes to keep the applied stem distinct from the non-applied stem in the past tense, so in cases where Ablaut would lead to a merger of the two past forms, suffixation is required.

Consider the examples in (15). The root /mo:i/ has the past form mo:z-ei-e; the applied stem mo:l-el- takes an Ablaut past form, mol-e:l-e. Notice that the ablauted form of the stem mo:l-el- is distinct from the past of mo:i-. The two past forms are distinct primarily by virtue of the fact that the root /mo:i/ mutates its final *i* to *z* in forming its past tense. All other examples in (15) illustrate the same point. By subjecting the applied stem to Ablaut rather than suffixation in forming the past tense, there is no merger of the past of the applied stem with the past of the corresponding non-applied stem.

Turn now to (16). The root /su:l/ has the past form sul-i:l-e. Suppose that the applied stem su:l-il- were to form its past by Ablaut; the resulting past form would be \*sul-i:l-e. But this form would be identical to the past of /su:l/. Instead of undergoing Ablaut, su:l-il- simply adds the past suffix. The resulting form, sul-il-i:l-e is distinct from the past of /su:l/ now.

We have discussed briefly two descriptions of the data in (15) as opposed to (16). One description accounted for the difference in behavior in terms of the observation that the stems to which the applied suffix is added in (15) end in i, whereas they end in l in (16). The second description accounted for the difference in behavior in terms of the observation that in (15) an ablauted form of the applied stem is distinct from the past tense of the corresponding non-applied stem, whereas in (16) such an ablauted form of the applied stem would be identical in shape to the past tense of the corresponding non-applied stem. We would like now to demonstrate that there is good evidence in Chi-Mwi:ni that the second description is correct.

One major piece of evidence is provided by a number of verb stems that end in the consonant i but fail to mutate to z before the past suffix. (Some examples of such stems were given in (5) above.) The first description would claim that such stems should behave like those in (15) -- namely, they should take an Ablaut pattern of past tense formation. The second description, on the other hand, claims that if subjecting the applied stem to Ablaut would merge the applied and the non-applied in the past, then suffixation will occur. Examine the data in (17):

(17) x-tana:zu <i>il</i> -a 'to renounce, forsake'	tanazu <i>il</i> -i:l-e
x-tanazu <i>il</i> -il-a (applied)	tanazu <i>il</i> -il-i:l-e
x-ta'amua-i 'to ponder s.t.'	ta'amua-i:l-e
x-ta'amua-il-a (applied)	ta'amua-il-i:l-e
x-sajii-a 'to record'	sajii-i:l-e
x-sajii-il-a (applied)	sajii-il-i:l-e
ku-ja:di <i>il</i> -a 'to argue pointlessly'	jadi <i>il</i> -i:l-e
ku-jadi <i>il</i> -il-a (applied)	jadi <i>il</i> -il-i:l-e
ku-jamii-a 'to treat generously'	jamii-i:l-e
ku-jamii-il-a (applied)	jamii-il-i:l-e
qa:ti <i>il</i> -a 'to kill'	qati <i>il</i> -i:l-e
qati <i>il</i> -il-a (applied)	qati <i>il</i> -il-i:l-e



The applied stems in (17) form their past tense by suffixation, not Ablaut. Thus they constitute a counterexample to the claim that the first description given above makes. On the other hand, the data in (17) support the second description. For if an applied stem such as *sajii-il-* were to undergo Ablaut, the resulting past form would be *\*sajii-i:l-e*, which of course is the past form of the non-applied stem *sajii-*.

Let us refer to our first description as the Phonological Solution. It attempts to predict how an applied stem will form its past on the basis of the phonological structure of the stem to which the applied suffix is added. Let us refer to our second description as the Morphological Solution -- and, in particular, the Avoidance of Homonyms Principle. We have now shown that the Morphological Solution predicts that the applied stems in (17) will parallel those in (16) and not those in (15) with respect to how they form a past tense. In both (16) and (17), following an Ablaut pattern of past tense formation would lead to merger of applied and non-applied stems in the past tense.

It should be pointed out here that we are not claiming that the Avoidance of Homonyms Principle determines in all cases whether suffixation or Ablaut will be followed in past tense formation. If one considers the data in (12), for instance, it is clear that the applied stem *su:k-ii-* could form an ablauted past *\*suk-i:i-e* (rather than the correct suffixed past *suk-il-i:l-e*), since the past of the non-applied stem *su:k-* is *su:sh-ii-e*. No merger would result. What we are claiming is that if the applied suffix is added to a stem ending in *l* or *i*, Ablaut will be employed except if to do so would result in identical past forms for both the applied and the corresponding non-applied stems.

There is yet further evidence in support of the Morphological Solution. There are a few verbal stems ending in the consonant *i* which do not change to *z* before the past suffix, but do not remain *i* either (as the stems in (17) do). Rather, these stems change their final *i* to *l* before the past suffix: they behave, in other words, just like applied stems. They are not applied stems, however, for they themselves may be followed by the applied suffix, which is never the case with true applied stems. In (18) we cite some examples:

(18) x-ta:mił-a 'to lean on, rest on'	tamil-i:l-e
x-tamil-il-a (applied)	tamil-il-i:l-e
x-kemel-a 'to scold, chide'	kemel-e:l-e
x-kemel-el-a (applied)	kemel-el-e:l-e
x-ta:ngil-a 'to recite a poem spontaneously composed'	tangil-i:l-e
x-tangil-il-a (applied)	tangil-il-i:l-e

Notice that in these examples the applied stem forms its past tense by suffixation rather than Ablaut. The Phonological Solution, which claims that stems ending basically in *i* require an applied stem based on them to undergo Ablaut, predicts that the past of tamil-il- should be formed by Ablaut, giving \*tamil-i:l-e. This is incorrect. The Morphological Solution, relying on the Avoidance of Homonyms Principle, predicts that tamil-il- will add a suffix, since if it would undergo Ablaut the resulting form would be identical to the past of the stem ta:mił-. And this is correct.

We have demonstrated that in those cases where the Phonological Solution and the Morphological Solution make different predictions, it is the Morphological Solution that makes the correct prediction. We take this to be strong evidence in favor of the Morphological Solution. It should be observed that there is potentially another source of evidence that we have as yet been unable to tap, due to the lack of relevant examples in our data. Namely, if there are any verb stems in the language ending basically in *i* which do not form their past tense by suffixation, but instead undergo Ablaut, we would predict -- given the Avoidance of Homonyms Principle as presently formulated -- that an applied stem based on such a verbal stem would form its past by Ablaut rather than suffixation. That is, we would expect the following set of data:

-famil- (a hypothetical stem)	fami:l-e (past)
-famil-il-a (applied)	famil-i:l-e (past of the applied)

We would expect the past form famil-i:l-e (which results from Ablaut) since applying Ablaut to form the past of famil-il- will not result in a past form identical to the past of famil-. If examples such as this do exist, they will strongly support the Avoidance of Homonyms Principle. If, on the other hand, the past of famil-il- turned out to be famil-il-i:l-e (with suffixation) we would be compelled to restrict the Avoidance

of Homonyms Principle so that it governs just how stems ending in *i* will form their past tense. Such a restriction would not be evidence in any way against the Avoidance of Homonyms Principle, but would be evidence against our proposed explanation of why an applied stem such as *mo:l-el-* (from */mo:l-el-/*) forms its past by Ablaut rather than suffixation: namely, avoidance of the three successive *l* sounds that would result from adding the past suffix to *mo:l-el-*. We have seen that such sequences do arise in forming the past of *su:l-il-* (from */su:l-il-/*), but we have claimed that this is because to apply Ablaut in cases such as this would merge the past of the applied stem with the past of the non-applied stem. If, however, our hypothetical applied stem *famil-il-* discussed above were to form its past by suffixation, giving *famil-il-i:l-e*, we would have evidence that there is in fact no general tendency to avoid three successive *l* sounds.

In any case, the presently available evidence all points to the validity of the claim that an Avoidance of Homonyms Principle is at work in *Chi-Mwi:ni*. One of the most interesting things about this example is its great systematicity. There are other examples in *Chi-Mwi:ni* where avoidance of homonyms is possibly a relevant consideration, but the avoidance is not systematic. Let us cite a couple instances. Recall that the clusters *mb*, *nd*, *nd*, and *ng* all change to *nz* before the past suffix. Thus stems of the shape *CVmb-*, *CVnd-*, *CVnd-*, and *CVng-* will have the identical past tense form, *CVnz-i-i-e*. Such merged past forms do not, however, always occur. Thus the stem *pa:nd-* 'to climb, rise' does have the past form *pa:nz-i-i-e*, as expected, but the stem *pa:mb-* 'to decorate' has the exceptional past tense form *pamb-i-i-e* (where the cluster *mb* exceptionally fails to change to *nz*, and the resulting difference in vowel length between *pa:nz-i-i-e* and *pamb-i-i-e* can be accounted for in terms of the difference in the nasal cluster -- cf. Kisseberth and Abasheikh (to appear) for discussion). There is, in addition, another stem *pa:ng-* 'to put in order, to rent s.t.' which should also be pronounced *pa:nz-i-i-e* in the past, but our informant [M.I.A.] is uncertain what its past form is. It may not be irrelevant that if one treated *pa:ng-* like *pa:mb-* and simply failed to change *ng* to *nz*, the resulting past tense form

would be pa:ng-i:i-e, and this would be the same as the past tense of the stem pa:ngu-i- 'to cancel, erase, wipe', since pa:ngu-i- forms its past by Ablaut, giving pa:ng-i:i-e. Avoidance of homonyms may be responsible for the exceptional behavior of pa:mb- and also for our informant's uncertainty over how pa:ng- forms its past tense. But this avoidance is not systematic, for one can find cases of merged past forms: Thus tu:nd- 'to pick off' has the past form tu:nz-i:i-e, as does tu:ng- 'to compose'.

Another case where avoidance of homonyms may be involved is provided by the stem ta:ngi-i- discussed earlier. This stem has the past form ta:ngil-i:i-e. Polysyllabic stems ending in i regularly form their past tense by Ablaut, so the expected past of ta:ngi-i- is ta:ng-i:i-e. This is not, however, the form that occurs. The explanation for this fact may be that there is another verb stem ta:ngu-i- 'to nullify, repeal (esp. ritual purity)', which does form its past tense regularly and thus undergoes Ablaut, giving ta:ng-i:i-e. If the stem ta:ngi-i- had been regular with respect to past tense formation, its past would have been identical to the past of ta:ngu-i-. But again this type of apparent avoidance of homonyms is not systematic. There are similar cases where merger does occur. Thus the past tense of the stem paki-i- 'to load' is paki:i-e (by Ablaut), as is the past tense of paku-i- 'to take food from a pan or pot and place on plates'. The Avoidance of Homonyms Principle, as it works in forming past tenses of applied stems, is perfectly systematic.

Another interesting feature of the Avoidance of Homonyms Principle is that the homonyms that are avoided are derived forms, not lexical forms. The past tense form of a Chi-Mwi:ni verb is derived by very general rules and there is no need to include the past tense stem of a verb in the lexicon. Given an instruction such as the following: "Given an applied stem built on a stem ending in i or l, construct its past form by Ablaut, unless to do so will merge the past of the applied stem with the past of the corresponding non-applied stem, in which case add the past suffix instead.", the following steps are required. A past tense form of the applied stem must be derived, applying Ablaut; then the past tense of the corresponding non-applied stem must be derived; the two past tense

forms must then be compared. If the forms are different, we have concluded the derivation of the past tense of the applied stem. But if the two past forms are identical, an alternative derivation of the applied stem's past is required, this time employing suffixation. In other words, the Avoidance of Homonyms Principle is transderivational in nature, requiring examination of the derivation of the past tense form of the non-applied stem in order to know which of two alternative derivations for the applied stem is to be chosen.

Past tense formation in Chi-Mwi:ni is a highly complex phenomenon, but one which reveals considerable regularity. The present paper has attempted to bring out the regularities that underlie one aspect of the general problem of past tense formation, namely, the construction of the past tense of an applied stem. In the process of doing so, some support has been given, we believe, to the claim that avoidance of homonyms may play a systematic role in grammar. Furthermore, evidence has been given for the need for transderivational devices, such as the Avoidance of Homonyms Principle stated above.

#### Footnotes

<sup>1</sup>The term "applied" (or "applicative") is widely used in Bantu linguistic literature to refer to a derivational affix which conveys various "prepositional" senses. Some examples of its uses in Chi-Mwi:ni are given below.

- (a) ninwandikilile Nu:ru xatí 'I wrote Nuru a letter'
- (b) Jama pikilile: nama sufuriya 'Jama cooked the meat with a pan'
- (c) mbigilile mwana:nawa 'He hit my child (on me)'

<sup>2</sup>A transderivational rule is one where in order to determine whether a rule is to be applied in the course of one derivation, reference must be made to another derivation. Such rules have been discussed to a certain extent in the area of syntax/semantics, but little discussion is to be found in the area of phonology. An exception is Nessly (ms.).

<sup>3</sup>The infinitive prefix is ku- underlyingly, but it has as morpho-phonemic variants x-, k-, and Ø. This alternation pattern will be discussed in detail elsewhere. The transcription used in this paper is fairly straightforward, but the following symbols perhaps require clarification: sh=s, ch=ç, t and d are dental as opposed to the alveolar t and d; d=ð. The reader will note that in many of the examples various

alternations in vowel length may be observed. These alternations are irrelevant to the present paper, and are therefore ignored; the reader is referred to Kisseberth and Abasheikh (1974) for discussion of the principles controlling these alternations.

#### References

- Kisseberth, Charles W. and Mohammad Imam Abasheikh. To appear. "On the analysis of Past Tense Formation in Chi-Mwi:ni."
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NOT YOUR USUAL USE OF YOU<sup>1</sup>

Richard J. Leskosky

In certain dialects of American English--including that made well-known by Archie Bunker--it is acceptable to use the second person possessive as an indefinite article:

- 1) Your average voter will vote on impulse.
- 2) Your major league ball players deserve every cent they get.
- 3) All of your Fords are good cars.
- 4) Your .38 Special is a handy gun to carry.<sup>2</sup>

Note that just as one ordinarily does not in any way own or possess an average voter or major league ball players, it is not necessary that the addressee of sentences (3) and (4) actually own or have in his possession a Ford or a .38 Special. In fact, the addition of own to these sentences to denote actual possession of the stated objects renders them unacceptable:

- 5) \*All of your own Fords are good cars.
- 6) \*Your own .38 Special is a handy gun to carry.

This use of the second person possessive is allowable, then, only when speaking of a general class of objects or persons. With singular objects there would arise confusion with the definite or regular possessive use of the form (the ur-your usage, so to speak). Where the object is obviously one of a kind and/or impossible to be possessed by the addressee, it is allowable to use the your-article since the object constitutes a whole class in itself:

- 7) Your Empire State Building used to be your tallest skyscraper, but now your Sears Tower is.
- 8) Your Mona Lisa is what you call your great art.<sup>3</sup>

This use of the second person possessive as an indefinite article is connected, I believe, with an analogous use of you which is more widely accepted and which is not so obviously restricted to informal usage.

In giving directions--to cite one of the most obvious examples--you can be used as an indefinite subject with a present tense verb:

- 9) How do you get to St. Louis?
- 10) Well, you take I-57 south until you get to I-70, and then you go west on that until you reach St. Louis.

Although on one reading (9) could be taken as an inquiry about the addressee's usual route to St. Louis, the more readily apprehended reading is the one in which the you does not refer to the addressee at all. Moreover, (10) can only be taken in this second sense; it cannot be read as some sort of command that the questioner travel a certain route.

Since this form of the pronoun is used impersonally or generally, one would expect the verb used to be generalized as well--that is, not to refer to a particular time; and it can be observed in the above examples that the generalized present is used. The link between this usage of you and this form of the present tense is illustrated further by the following example:

- 11) How did you get to St. Louis (last Thursday)?  
which can only be answered in the first person and cannot be construed as asking for directions. If, on the other hand, the parenthesized adverbial is changed as follows
- 12) How did you get to St. Louis before I-57 was completed?  
then the indefinite reading is once again a possibility, the answer to which is
- 13) You (had to take) U.S. 45 south, etc.  
(took )

Here again neither questioner nor answerer need ever have actually travelled this or any other route to St. Louis for this exchange to be true, acceptable, and/or felicitous. The time adverbial specifies a period over which the verb ranges indefinitely despite its overt tense and in this way actually allows a less definite interpretation than the unqualified past (as in (11) without the parenthesized element) which can only refer to a specific event.

The indefinite or impersonal reading of you is not, of course, restricted to sentences asking for and giving directions but can be used in any general statement.





26) During the Gold Rush claims had to be guarded....

27) [One] can't have [one's] cake and eat it, too.  
[?They] [their]

28) ??A cake can't be had and eaten, too.

As can be seen, both the they form and the passive form run into problems with some examples. Since this discussion is concerned primarily with pronouns, the passive will herewith be disregarded; and although they may arguably be merely a plural of one, it will be regarded as a separate form because of the discrepancies in the acceptability of the parallel examples above.

American English, then, can be said to have impersonal pronominal forms one, they, and you. Of these, one is the most formal, and you the least formal. On the other hand, the morphemic distinction between polite and familiar forms (between thee/thou and you)<sup>4</sup> no longer exists in the second person in the great majority of the dialects of English. I submit that these phenomena (lack of a familiar/polite distinction in the second person pronoun, use of the second person pronoun in an impersonal sense, and generalization of the second person possessive into an indefinite article) are interrelated. They denote an informality with respect to the addressee and serve to establish a sense of equality between speaker and addressee.<sup>5</sup> In this they are in accord with the third rule of politeness set forth by Robin Lakoff (Lakoff 1973)--to wit, "Make [the addressee] feel good--be friendly."

Lakoff notes that this rule--the so-called "rule of friendliness"--seems to be gaining ground in middle class American society at the expense of another rule--that is, the "rule of aloofness", "Don't impose--remain aloof." This generalization of the second person to, in effect, personalize the impersonal would certainly be consistent with such a trend. Lakoff further suggests that in more stratified societies the rule of aloofness would predominate. If we consider the relationship between the second person and impersonal forms in other languages with more stratified cultural histories we can see definite contrasts forming along the lines of these rules of politeness.

	<u>A</u>	<u>B</u>
Second Person	One form--no distinction	Familiar/polite distinction
Impersonal Pronouns	Familiar/polite distinction	One form--no distinction
Indefinite Article	Borrowed from second person	Part of regular determiner system

Paradigm A holds in the dialects of American English under consideration here. The crucial entry is that of the unary second person. The prediction is that a language devoid of formal distinctions here would tend to operate on a familiarity principle rather than on an aloofness principle. Such a language should tend to use impersonal constructions analogous to those in American English. Unfortunately, I have not been able to examine any other language lacking the distinction in the second person.

Paradigm B represents a more formally polite language where there is a distinction made between polite and familiar uses of the second person; here the aloofness principle would hold ascendance over that of friendliness or equality. Given this distinction, one would predict the lack of an impersonal form with the appearance of the second person. Such is the case with the languages I have looked at--French, Spanish, German, Russian, and Latin.<sup>6</sup> In some French sentences a second person form is allowable with the present tense in general statements, but this seems to mean something like "you and anyone else in your situation"<sup>7</sup>; moreover, in the past such forms are not acceptable. In Russian, second person forms of the verb without pronominal subjects are allowable in the present tense in proverbial type statements, but in the past tense it is difficult to judge what is going on since there is no distinction between personal endings in the singular. Thus, while there is no positive corroboration on cross-linguistic grounds, the negative sides of the hypothesis have generally been upheld in the Indo-European languages looked at.

Summary: Some indication is given that American English may be affected structurally by rules of politeness and that Lakoff's third rule of politeness (that of friendliness or equality) is more influential in English than the first rule (that of aloofness).<sup>8</sup> The claim is

made that the informality of the second person pronoun in English allows its generalization to impersonal forms. Cross-linguistic evidence shows that where there is a familiar/polite distinction in the second person such generalization is not likely to occur; languages with situations analogous to that in English have not been examined by the writer. It further seems that the solidarity principle (discussed at length in Brown and Gilman 1960) at work in address systems with familiar/polite dichotomies has shifted in American English from the address system to that of the impersonal forms. Since we address everyone the same way, the formality (anti-solidarity) of impersonal forms becomes almost incongruous, and this formality is mitigated by the introduction of the familiar you.

- R. Brown and A. Gilman, "The Pronouns of Power and Solidarity", in T.A. Sebeok (ed.), Style in Language, MIT Press, 1960, pp. 253-76.
- R. Lakoff, "The Logic of Politeness; or, Minding Your P's and Q's" in CLS 9.

#### NOTES

- 1 I wish to thank those I consulted on non-English languages and exonerate them of any blame attached to my misuse of their assistance: Professor Richard Figge on German, Professor Stephen P. Hill on Russian, Professor Edwin Jahiel and James Wentz on French, and Michael Waag on Spanish.
- 2 My main concern here is with the mere existence of this use of your and not with the intricacies of its distribution (e.g., why is \*Your .38 Special is your handy gun to carry unacceptable?). Such a study may prove to be of interest, particularly if a linguist with this form in his dialect can be found to write it.
- 3 It might be noted that this form is also acceptable with abstract nouns.
- 4 The fact that it was the polite form of the second person that was retained does not vitiate the following arguments based on a familiarity principle since once the distinction is dropped there is nothing to make the speaker aware of the history of the retained form.

- 5 Pure speculation: The second person normally appears less frequently in discourse than either the first or third persons. The device of the impersonalized pronouns increases the number of occurrences of second person pronouns, and even though used impersonally they nevertheless tend to place the addressee more within the matter of the discourse by approximating a parity of appearances between the second person and the first and third. The equality of the third principle of politeness noted in the text operates perhaps on two levels here: statistical parity of frequency of occurrences and lessened formal barriers between speaker and addressee.
- 6 I treat these non-English cases only discursively and scantily in the interests of space and because my primary concern is with English.
- 7 This is perhaps the beginning of a shift toward the English usage. Brown and Gilman note a tendency among younger French speakers to use the familiar form more readily at the expense of the polite form.
- 8 Further speculation: Use of you and your tends to make the subject matter more immediate, more localized around the spatio-temporal nexus of the discourse itself. This seems to be a fairly common tendency in dialects of informal speech, which can also be seen in the consistent use of the present to narrate past events as in
  - 29) This guy comes up to me and says, "Got a match?"
 This tendency is further illustrated by the use of this in the above example and in
  - 30) There's this guy at the track that's got this sure-fire system for picking winners.

to denote particular objects or persons (as opposed to general ones denoted by your) which are not actually present.



ASSERTIONS NOT MADE BY THE MAIN CLAUSE OF A SENTENCE

Lise Menn

(A response to recent trumpet calls for functional considerations in semantax)

0. Assertion is a primary function of speech; one finds it, as seems intuitively correct, treated as the basic illocutionary act, from which others are distinguished in various ways. But the question: What does the sentence S assert? turns out to be difficult to answer, and the answers we arrive at are richly dependent on the context of S. The gut reaction that makes 'What does it assert' trivial for

0.1 My hat is on the table.

becomes unreliable when it is confronted with

0.2 I believe that it might be snowing.

which is very seldom likely to mean what it 'says'.

Nevertheless I will have to proceed on an intuitive basis in the absence of well-developed criteria. I will attempt to describe what several types of sentences assert by looking at their meanings in context, rather than by assuming that their forms can tell us what they assert. The relation of their forms to their meaning is therefore, I hope, not prejudged.

It has been natural to look first at what is probably the paradigm relationship between clausal form and function; "the" proposition expressed by the main clause is asserted; all other propositions, except appositive (non-restrictive) relatives, are dumped into a box marked 'presupposition', which, Morgan 1973 cautions us, is likely to be a very heterogeneous collection.

But this relationship between main and subordinate clause, exemplified by

0.3 George realizes he ought to go home.

0.4 Her coat, which was made in Siberia, is comfortable at  
-20°F.

is not the only one possible. In this paper I will discuss three variations from this norm.

In section 1, I consider cases where an embedded proposition, usually a sentential object complement of the main verb, carries the assertion of the sentence. This situation ought to be considered as more typical of embedded sentential complements than is usually done.

In section 2, I suggest that the either/or choice of presupposed vs. asserted is not always clear, and is a matter of what the speaker and hearer assume is known to one another. In the sentences considered, the main clause is asserted, and the type of relative clause modifying the subject of the main clause may be presupposed, asserted, or in some sort of squish between these poles.

In section 3, I discuss another sort of relation between main clause and relative clause. In these sentences, the subordinate clause implies the main clause, and it is this implication which I argue is asserted by the sentence.

Here I make considerable use of Donellan's (1966) distinction between attributive and referential description, which needs however a certain amount of amplification in order to handle the distinction between the assertion of a conditional and the assertion of the instantiation of a conditional.

# 1. A Gricean limit on making assertions with embedded propositions

Jerry Morgan in his thesis (1973) makes the interesting observation that "...sentences containing...verbs like make, even though their illocutionary content is not the embedded proposition, can in fact be used to inform someone of that proposition, while analogous sentences with factive verbs cannot." Morgan offers the following dialog examples:

- 1.1 Where's Harry?  
Joan made him leave.
- 1.2 Where's Harry?  
\*Joan realized he left.
- 1.3 Where's Harry?  
\*Did Joan realize that he left?



This list of examples is easily extended. Other admissible responses to 'Where's Harry?' include: He managed to leave. I hear he left.  
 Joan says he left. Joan hopes he left.  
 Joan thinks he left.

Notice that the responses mentioning Joan suggest that Joan is the source of the answerer's information about Harry, and their non-factivity shows up in that they are all three compatible with the continuations

...but I really couldn't swear to it.  
 ...but I think I just saw him.  
 ...and I haven't seen him around.

Use of other factive main verbs also produces inadmissible responses to 'Where's Harry', as Morgan states: \*Joan remembers that he left.

\*Joan knows he left.

\*Joan just realized he must have left.

However, this contrast between the complements of factive verbs and complements of other sorts of verbs that take sentential complements does not appear when the subject of the factive verb is either first or second person. One can answer 'Where's Harry?' by saying

1.4 I remember that he left.

1.5 I know that he left, although I don't know when.

1.6 I just realized that he must have left.

(1.7 \*I realize he left. is bad for other reasons related to the tense of the verb, and, I think, its inchoativeness.)

1.8 You should remember that he left.

1.9 Don't you **remember** that he left?

1.10 Don't you know he left?

1.11 Don't you realize he left?

Therefore, Morgan's observation is actually a report of a distributional gap. This gap can be explained using his work on factive verbs.

Step 1. The speaker of a sentence containing a factive verb, by Morgan's 'free pass' principle, commits himself to a belief in the proposition expressed by the complement of the verb.

2. Therefore, a speaker who responds 'Joan knows he left' to the question 'Where's Harry?' must also be of the opinion that Harry left.

3. A Gricean principle may be expressed 'make the strongest claim which you believe to be the case'; if a weak claim is made, the conversational implication arises that a stronger claim would be untrue.

Hence, for example, 'some linguists are purple' conversationally implies 'not all linguists are purple'.

4. Another Gricean principle is 'be relevant'. It is usually irrelevant to describe Joan's opinion, when asked for your own. If you give hers, therefore, you imply that it is relevant. The normal way for it to be relevant is for it to be the source of your information, or somehow acknowledged to be superior information to yours.

5. Both #3. and #4. work together, producing the effect that if you answer 'Where's Harry?' by 'Joan knows that he left', you conversationally imply "I don't have enough evidence to decide whether he left or not; all I know is Joan's opinion."

6. This implication in #5. contradicts the one in #2., that you are of the opinion that Harry left. The contradiction yields the inadmissibility of 'Joan knows he left.' Q. E. D.

Now, one would predict that if the speaker does not commit himself to an opinion on Harry's whereabouts, statements about Joan's information become admissible. This is in fact the case.

1.12 Where's Harry?

Joan says she realizes he left.

1.13 (a fuller scenario) Where's Harry?

I don't know, but I was just talking to Joan, and she was saying that she just realized he left.

However, if the speaker does mention a source of knowledge superior to hearsay, we lose this admissibility gained by embedding the factive 'realize' under the non-factive just exemplified by 'say'.

1.14 Where's Harry?

\*I saw him leave, and I was just talking to Joan, and she says that she just realized he left. (Assuming the speaker trusts his own eyes.)

Therefore it is clear the factivity of 'know' is indeed a germane variable.

Finally, if we set up the scenario carefully enough, we can make Joan's information sufficiently relevant so the same implicative communication, 'Joan knows he left >he left' found in 'I know he left >he left' does work.

For suppose the questioner Q has been asking Joan where Harry is, and the answerer A of our dialog has been near enough to Joan and Q so that he knows - and would be reasonably presumed by Q to know - what Q has asked Joan, but has not heard Joan's answer to Q: he only knows that she did answer. A figures, when Q turns and asks him where Harry is, that Joan must have told Q that she didn't know. (That being the most likely reason why Q, a reasonable person, immediately asked A the same question he had just asked Joan.)

A can then respond to Q, by way of informing him that Harry left:

1.15 Joan knows Harry left; (I wonder why she didn't tell you?)

1.16 Joan ought to realize he left.

1.17 You mean Joan doesn't know he left?

etc., avoiding the usual implications arising via the Gricean relevance principle, #4.

## 2. Assertions expressed by adjectival relative clauses

The function, in a sentence, of a relative clause is, in the cases I will discuss in this section, dependent on the information that the speaker assumes the hearer has (when the function of the clause from the speaker's point of view is considered) or on the information the hearer assumes the speaker believes him to have (when the function of the relative clause from the hearer's point of view is considered). In other words, the distinction between sentences with restrictive relative clauses, generally considered to be 'one' speech act, and sentences with non-restrictive (appositive) relative clauses, generally considered as 'two' speech acts, are determined by no formal criteria, but by the assessments of each other's knowledge made by the parties to a conversation.

Consider the party scene in which A says to B:

- 2.1 The man in the red chair who is flirting with Alice's mother is my uncle.

The predicate

- 2.2 is flirting with Alice's mother

has the property of being observable, but not always obvious at a glance, in normal circumstances. In this respect it contrasts with

- 2.3 is sitting in the red chair,

which is both observable and obvious in normal circumstances, and with

- 2.4 teaches economics

which is neither observable nor obvious (nor easily deduced from observation) in the circumstances that come to mind as the natural ones in which to make statement 2.1.

If A has assumed that B is fully aware of the flirtation, "who is flirting with Alice's mother" isn't part of his assertion; it is part of the identification of the man, also identified as being in the red chair; the only assertion in uttering the sentence 2.1 is that the man in question is A's uncle. The proposition that he is flirting with Alice's mother is presupposed.

If, however, A has assumed that B is not aware of the flirtation, the same relative clause becomes an additional assertion, an appositive relative, not presupposed at all. A formal distinction is possible - one may mark the appositive but not the restrictive relative with 'by the way':

- 2.5 The man in the red chair, who, by the way, is flirting with Alice's mother, is my uncle.

But without such marking the function of the relative clause is formally indeterminate - and may be construed differently by A and B. That is, suppose A assumes that the flirtation has been rather blatant, and that B knows all about it, but B is a trifle obtuse about such matters, and finds the relative clause to contain new information. Then the relative clause was a presupposition for A, but an assertion for B.

Furthermore, A doesn't have to have a firm opinion one way or the other about the state of B's knowledge. As long as he doesn't add

'by the way' or some other marker of apposition, it is not necessary for the proposition about the flirtation to be assigned either to the restrictive or non-restrictive category.

Consider 2.6 The man in the red chair who you may have noticed flirting with Alice's mother is my uncle.

This phenomenon of a proposition being able to 'hover' between presupposition and assertion can be shown for any proposition which a speaker may suppose that his addressee might or might not have noticed, any proposition which is observable but not obvious, to use the terms introduced earlier in this section. And it seems to me that this squish also extends to any proposition, observable or not, such that the speaker might be in doubt as to whether the addressee already knows it or not. The only additional requirement is that the speaker not know whether he has already uniquely identified to his addressee the subject of his assertion; the Gricean prohibition of redundancy makes any proposition about a fully identified thing an assertion, at least if we assume that the only reason for giving presupposed information is to aid in identification.

### 3. The 'consequential' assertion

There is a certain duplicity - which seems by the usual tests to be a vagueness rather than an ambiguity - in sentences which at first seem to display the canonical relation of assertion in the main clause, presupposition in a relative clause. This is a complication, I think in some discussions of reference - see Donellan (1966).

Consider the nonsense sentence (adapted from Morgan's thesis)

3.1 The man who deveined Martha is a Marplot.

It has two readings, which can be expressed by the paraphrases

3.2 I happen to know that the man (identified as being the man who deveined Martha) is a Marplot. (non-consequential reading)

3.3 I declare that the man identified as being the man who deveined Martha, by virtue of the fact that he did so, is a Marplot. (consequential reading)

In 3.2, the proposition 'X is a Marplot' is something the speaker knows about X, who is identified as the man who deveined Martha. There is no evident relationship between the two predicates 'deveined Martha' and 'is a Marplot'. This reading is easiest to get if the relative clause 'who deveined Martha' is referential (in the sense of Donellan) that is it picks out a real person whom the speaker has in mind, rather than being attributive (in the sense of Donellan, again), that is, describing an unknown person whose existence has been deduced from the facts that Martha has been deveined and that a man must have done it.

3.2 is the obvious reading of most example sentences with a restrictive relative clause (or restrictive adjective, *mutatis mutandis*) describing the subject of the main clause. What is presupposed and what is asserted seem to be intuitively clear, and this reading is the only one likely to come to mind for, e.g., 3.4 The man who I met yesterday is a telephone operator. The copula is replaceable by 'happens to be', and more generally, in this reading, the main verb V(+ tense) can be replaced by happen(+ tense) to V, unless the predication is complicated by containing a modal.

One might, with this non-consequential reading of 3.1, have the following dialogue:

- 3.5 Bruce: Did you hear what happened to Martha? What do you know about the guy who did it?
- 3.6 Arthur: Well, the man who deveined Martha is a Marplot, and he comes from Peoria.
- 3.7 Caroline: You're all wet, Arthur. The Marplot from Peoria didn't devein Martha.
- 3.8 Arthur: Oh? I was sure he did.

Now, turning to reading 3.3, we have a much closer relationship between the main clause and the relative clause. It is not so obvious that the usual description could hold - that the relative clause identifies the subject and is presupposed in the utterance, while the main clause makes the assertion. I have no grounds to think that this description is inaccurate insofar as it describes the presupposition, this time; it is the description of the assertion that seems to me to

need revision so that we can capture the distinction between reading 3.2 and reading 3.3.

I suggest that the consequential reading of 3.1, the one paraphrased as 3.3, asserts an if-then proposition, a proposition of the form  $A \supset B$ ; the presupposition can be viewed, in addition to the description of it just given, as the proposition that the antecedent conditions of the implication are met, or, to put it another way, the presupposition of the reading may be described as the proposition that the conditional is here instantiated.

Let me try to build up some feeling for this type of sentence by bringing in some more varied examples and a dialog in which the consequential reading is naturally prominent. (Give the predicates attributive, not referential, readings.)<sup>1.2</sup>

3.9 The woman who saved the drowning child deserves a medal. (for it.

3.10 The eggplant that ate Chicago must be a most unusual vegetable.

3.11 The house which is divided against itself cannot stand.

In the consequential reading, any of these sentences may have (e.g.) 'therefore' or 'by virtue of that fact' interposed at the end of the relative clause:

3.12 The eggplant that ate Chicago, by virtue of that fact, must be a most unusual vegetable.

Notice how close these sentences are to assertions of conditionals:

3.13 Any eggplant that can eat Chicago is a most unusual vegetable.

3.14 A house divided against itself cannot stand.

Let us try the dialog:

3.15 Watson: Did you hear what happened to Martha? Somebody deveined her!

3.16 Holmes: The man who deveined Martha is a Marplot, undoubtedly.

3.17 Watson: But a woman did it!

3.18 Holmes: Well, then, the woman who did it must be a Marplot.

It should be clear that in speaking of conditionals and implications, I have not meant only to consider analytic implications. Another version

of the Holmes discourse might have run:

- 3.15 Watson: Did you hear what happened to Martha? Somebody deveined her!
- 3.16 Holmes: The man who deveined Martha is a Marplot, undoubtedly.
- 3.19 Watson: He couldn't be a Marplot, because he didn't have webbed feet.
- 3.20 Holmes: Extraordinary! Imagine someone who is not a Marplot wanting to devein Martha!

I have been unable to frame a formal argument to support my claim that consequential readings like 3.3 should be analyzed as the assertion of a conditional plus the presupposition that the If-term of the conditional is satisfied. An attempt to fashion an argument of the form: I say that A asserts P, because it is clear that not-A asserts not-P, seems to work very badly, to become circular, apparently because ordinary language negation of a conditional is a little delicate. The negation of 'A, therefore B' is something like 'even if A, maybe not B'. By the time we have been careful to preserve the conditional under negation, we have built it into the negation and have a circular argument, so far as I have been able to see. I must abandon this matter here.

Another problem raised by the analysis I suggest for consequential readings is that it implies that the major logical distinction between consequential statements and conditionals is the presupposition of instantiation in the former. While I find this attractive, it requires some further delineation of the notion of existence/instantiation. I say this because some descriptions of 'the presupposition of existence' seem to suggest that if statements lack a presupposition of instantiation, they are not about anything, which is absurd. This consequence has been overlooked because it is no more than a side-effect of the discussions I am about to cite; neither Donellan nor Morgan is concerned, in these papers, with indefinites or conditionals; but their discussions just don't seem to me to leave a natural way to talk about such perfectly respectable assertions as 'If one's uncle is married, his wife is one's aunt' or 'If a committee is appointed, they'll take months to get through the evidence anyway.'



With these in mind, consider this quote from Donellan (p.203); "The presupposition or implication ["that the speaker believes something fits the description"] is borne by a definite description used attributively because if nothing fits the description the linguistic purpose of the speech act will be thwarted. That is, the speaker will not succeed in saying something true, if he makes an assertion..."

Morgan provides a way for 'one's hypothetical uncle' to exist, but at the cost of blurring the distinction between hypothetical and real (p.77): "...one might object that the matter of existence is somehow inherent in the communicative act of referring...that people as language users do not, in fact cannot, refer to objects which do not exist in the discourse or in the mind, therefore, reference to some object is prima facie evidence for its "existence"..."

Further indications that the analysis offered in this section remains in difficulty until this whole area of semantics has been better analyzed are found in the Notes.

#### Notes

1. The notions consequential/non-consequential and referential/attributional are independent, but it is easier to 'get' consequential readings with attributional uses of predicates. The four combinations are illustrated below. I have not controlled for the axis appositive/restrictive in these four examples. Appositive/consequential statements are not impossible, as example a) shows; this is a stumbling block for my analysis of consequential statements as it is presently set up. I think the solution of the apparent paradox of requiring the relative clause in a) to be asserted (since it is appositive) and also presupposed (since it is the if-clause of a consequential statement) will be in the direction of replacing the simple either/or oppositions, invoked throughout work on logical structure, with more subtle distinctions.

a) consequential-referential

George, { since he } is the concertmaster, ought to shake hands  
           { who } with the conductor.

## b) consequential-attributive

The violinist who is the concertmaster ought (therefore) to  
shake hands with the conductor.

## c) non-consequential-referential

My cousin who went to Swarthmore majored in astronomy.

## d) non-consequential-attributive

The girl whose footprints we found dropped this monkey wrench.

2. I have assumed that it is not possible to change from attributive to referential discourse within a single statement. It is possible that this assumption represents some oversimplification.

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THE ROLE OF ANALOGY IN NON-DERIVED FORMATIONS IN ZULU <sup>1</sup>

Margie O'Bryan

0.1 The three languages which comprise the Nguni subgroup of Southern Bantu--Zulu, Xhosa, and Swazi-- contain a process of palatalization by which labial and alveolar consonants become palatals in certain environments. Palatalization results primarily however, from the incompatibility of bilabial stop consonants with the semi-vowel w. The most interesting case of palatalization of bilabial stops, and the one which is the subject of this paper, is in the environment before the passive suffix -w-. Although it appears that all three of the Nguni languages display the same basic type of behavior with regard to this palatalization process before -w-, I will deal exclusively with Zulu in this paper, the reason being simply that a much greater amount of data is available on this language than on the other two.

The changes effected in bilabials are:

ph → sh (= a pre-palatal fricative)

p → tsh (= a voiceless pre-palatal ejective affricate)

b → j (= a voiced pre-palatal affricate)

B (= a bilabial implosive) → tsh

m → ny (=a pre-palatal nasal)

mp → ntsh

mb → nj

0.1.1 There are various possible manners of viewing and describing the nature of the palatalization of these bilabial stops before -w-. It can probably be regarded basically simply as

a phonetic dissimilation of bilabial sounds. (The problem of the proper characterization of this process will be more relevant to later discussions).

1.1 The most interesting facet of this palatalization process goes beyond its phonetic aspects; for we find that bilabials become palatals before the passive suffix -w- not only when the two sounds occur contiguous to each other, but, in some cases, also when the bilabial is separated from the passive suffix. The following examples illustrate the palatalization of bilabials both immediately before the passive suffix -w- as well as at a distance from the suffix. Examples of forms where palatalization does not occur at a distance are also given:

<u>Root or Stem</u>	<u>Gloss</u>	<u>Passive Stem</u>
angam-	lean over;	anganyw-
angamel-	lean over for	anganyelw-
bem-	smoke	benyw-
bemelan-	smoke for	benyelwan-
bongob-	one another	bongojw-
	harbour ill	
	will	
bongobel-	harbour ill	bongojelw-
	will for	
caBana-	think	catshangw-
shishimez-	prod to action	shishinyezw-
bub-	perish, die	bujw-
bubis-	kill, destroy	bujisw-
bumb-	pile up	bunjw-
bumbel-	pile up for	bunjelw-
bumbelel-	mass together	bunjelelw-
BaBaz-	praise, admire	batshazw-
qopholoz-	pick a quarrel	qosholozw-
cumbulul-	handle something	cunjululw-
	disgusting	
bazimul-	glimmer	bazimulw-
hwaBuzel-	walk with	hwaBuzwlv-
	stiff garments	
cophelel-	be in earnest	cophelelw-
mpaBaz-	slap in the	mpaBazw-
	face	
jambalal-	lie flat out	jambalalw-

1.2 At first glance there seem to be very few well-defined conditions on the occurrence of palatals rather than bilabials in passive formations. In fact, there are only two which are immediately obvious and straightforward: One of these conditions concerns a restriction on palatalization, this being that the bilabial stop must not be the first consonant of the root. Thus, this process does not affect roots of the shape VC- or C-. Passives of roots of this shape are always formed by means of an epenthetic vowel i between the root-final consonant and the suffix: e.g. aB- 'apportion, divide': pass. aBiw-; eB- 'steal': pass. eBiw-; f- 'die': pass. fiw-. Palatalization at a distance never takes place in such forms either: e.g. eBanw-, passive reciprocal of eB-; aBelw-, passive of the applied of aB-; felw-, passive of the applied of f-. The other obvious condition on palatalization involves the regularity of this process when the bilabial stop and the -w- are contiguous. Under these conditions, palatalization always occurs. This will be discussed further below.

Although the above are the only obvious conditions on palatalization, closer scrutiny reveals that the manner in which this process of palatalization applies is quite well-motivated in terms of the basic morphological structure of Zulu.

1.3 The manner in which palatalization operates can be seen most clearly by dividing verbal forms into four types and discussing the process with regard to each of the four types. The four main divisions into which verbal formations appear to fall with regard to palatalization are the following:

1.3.1 Passive formations which are composed of a root or stem in a final bilabial stop plus the passive suffix: e.g. benyw-, pass. of bem- 'smoke'.

1.3.2 Passive formations which are composed of a(n)(independently attested) root or stem in a final bilabial stop plus one or more suffixes in addition to the passive suffix: In such formations the passive suffix -w- will be separated from the bilabial stop by the other suffix(es), since when several suffixes are attached to a root or stem, the passive suffix is the right-most<sup>2</sup>: e.g. bujisw-, pass. of the causative of bub- 'perish, die'.

1.3.3 Passive formations in which there is a bilabial stop occurring at a distance from the passive suffix, but which are not (clearly) composed of a root or stem in a final bilabial: e.g. Batshazw-, pass. of BaBaz- 'praise', where there is no root BaB-<sup>3</sup> attested; cunjululw-, pass. of cumbulul- 'handle something disgusting', where there is no root cumb-<sup>\*</sup> attested; klanyuzelw-, pass. of klamuzel-, applied form of klamuz- 'eat crisp or unripe fruit or vegetables', where there is no root klam-<sup>\*</sup> attested. In other words, in such cases, what appears to be the simplest (or most basic) stem is something other than that which ends in the bilabial stop.

1.3.4 Passive formations composed of an ideophone plus a verb-forming suffix plus the passive suffix: e.g. dunyuzw-< dumu-z-w- 'cause a booming sound', where dumu is an ideophone meaning 'of a booming sound', and -z- is a suffix used to form verbs from ideophones, often with causative meaning. Ideophones constitute

a large and interesting class of morphemes in Zulu. They will be explained and described in 1.4.4 below.

1.4 The general manner in which palatalization operates within the four groups just outlined will now be discussed.

1.4.1 When roots or stems in final bilabials have the passive suffix attached directly to them, thus causing the bilabial and the -w- to come into direct contact with one another, palatalization is productive and absolutely regular, no exceptions having been found in either native or borrowed words: e.g. benyw-, pass. of bem- 'smoke'; dishw-, pass. of diph- 'dip' (borrowed from English).

1.4.2 Forms in the second group cited above--that is, those composed of a root or stem in a final bilabial plus one or more suffixes separating the bilabial stop from the -w- --do not show palatalization of the bilabial to the extent found in forms where the bilabial and passive suffix -w- are contiguous. We do find, however, that palatalization occurs at least alternately in these forms, so that in many cases, these verbal derivatives of roots in final bilabial consonants have two possible surface appearances--one in which the bilabial has become a palatal and another in which the bilabial stop remains. In cases where a single form is preferred, this form nearly always shows the palatal consonant rather than the bilabial: e.g. bosobisw-/baso,ji passive of the causative of basob- 'watch over' bunjelw-, passive of the perfective of bumb- 'pile up'; gatshelw-, passive of the applied of gaD- 'brag'; gaBisw-/gatshisw-, passive of the

causative of gaB- 'pride oneself on'; gaBiselw-/gatshiselw-, passive of applied of the causative of gaB-. (Other examples of this type can be found in 1.1 above).

While the occurrence of palatals rather than bilabial stops in these forms in which the bilabial stop is at a distance from the -w- seems somewhat strange from a phonetic point of view, it is quite reasonable from a morphological standpoint: Since bilabial stops always become palatals when they are contiguous to -w- (that is, when no suffix intervenes between the root or stem-final bilabial and the -w- (e.g. benyw < bem-)), allowing the palatal to occur in derivatives, where the bilabial and the -w- are separated (e.g. benyelwan-) keeps the root or stem identical in all of its passive forms: e.g. passive stem of bem- is beny-. Thus, although the palatalization process appears to have a phonetic basis, evidence from forms occurring in this group presently under discussion indicates that its extension has a morphological basis. A situation such as this, where a particular stem form is extended throughout a paradigm or category or where the scope of a phonological (or phonetic) rule is extended or limited in order to serve some morphological function is, of course, quite common and has been discussed at length in recent literature. Thus, the occurrence of palatals (from bilabials) at a distance from the passive suffix would seem to be well motivated in terms of what we know about morphological conditioning of (originally) phonological (or phonetic) rules. The difference between the case under investigation here and most



that have been discussed is that palatalization seems to be optional when the bilabial is at a distance from the -w-. This does not seem entirely unreasonable, however; for we wouldn't necessarily expect as much cohesive force to exist between these different passive formations as that which binds members of a paradigm, for example.

1.4.3 Forms in the third group cited above--that is, those which are apparently not divisible into an independent root or stem in a final bilabial stop plus one or more suffixes preceding the passive suffix -w- (e.g. cunjululw- < cumbulul-)--present a more interesting problem than the type in the second group just discussed. For, in these non-segmentable (or non-derived) forms, there is no apparent motivation for the change of the bilabial stops to palatals, since there exists no simple root or stem in a final bilabial which would come into direct contact with the passive suffix -w-, thus creating a "passive stem" with a palatal (and thus a model) which could then be used as the basis for palatalization in passives of derived verbal formations. Nevertheless, we find large numbers of these non-derived stems occurring with palatals in their passive formations. Palatalization does, however, seem to be somewhat more sporadic than for forms in the second group. In many cases, forms with the unchanged bilabial are preferred; in other cases, forms in which palatalization has occurred are used solely (or primarily); in still other cases, alternate forms are used with no apparent preference of one over the other. Occasionally, if several derivatives of a

single verbal root exist, some will be found with palatals and others with bilabials remaining: e.g. BaBelw-/Batshelw-, pass. of BaBel- 'burn off grass'; Banjalalw-, pass. of Bambalal- 'neglect'; BeBethw-, pass. of BeBeth- 'eat into; gnaw away at'; cacamezelw-, pass. of cacamezel- 'act carefully, patiently'; sunguBalw-, pass. of sunguBal- 'creep through a narrow aperture', but sunguBez w-/sungutshezw-, passive of the contracted causative of sunguBal-; bamazelw-/banyazelw-, pass. of bamazel- 'act in a rough, uncontrolled manner'.

Although according to the manner in which these forms are cited in Doke and Vilakazi (henceforth, D and V), palatalization seems to be more sporadic in non-derived formations, the process can probably still best be regarded as basically optional. For, there seems to me to be no good reason for why one non-derived form would always change the bilabial stop to a palatal in the passive, or for why another form, very similar or identical in structure, would always occur with the unchanged bilabial, or for why others would have one derivative with a palatal and another with a bilabial, while still others would have alternate forms occurring. This manner of listing the forms in the dictionary would seem to me to be, rather, a result of the fact that there simply is not as strong a feeling for palatalization in non-derived forms as there is in forms where the palatalization is motivated by actually occurring simpler forms with final bilabials. This might result in elicitations from speakers which would vary in the use of palatals versus bilabials in passive formations

to a much greater degree than with actual derived forms, where probably nearly all speakers would use the palatal alternate as much as, or sometimes more than, the bilabial alternate.

Thus, if we assume that palatalization is basically optional (although somewhat more sporadic) in passives of non-derived, as well as in derived, formations, the question still exists as to why palatalization should take place without an actual model to motivate its occurrence.

1.4.4 Before attempting to answer the above question, it is practical to discuss the types of forms cited in the fourth group above--that is passive formations derived from ideophones. Ideophones, sometimes referred to as radical descriptives, are extremely numerous and occupy a very large and important position in the Zulu language. These words, often onomatopoeic, usually describe concepts such as manner, color, sound, or action. Since there is no real parallel in English (or in most European languages) to ideophones, exact translations are difficult. They usually can be translated fairly accurately, however, with 'of' or 'pertaining to': e.g. Báni 'of flashing light'; gózololo 'of staying a little'; súnuluzi 'of poisoning'; gókao 'of stirring porridge'; díndilizi 'of a dead body lying'; di 'of doing nothing'; mbo 'of covering over'; mu 'of complete numbers'.

Ideophones are uninflected and are usually found following the verb ukuthi 'to act, demonstrate, express, manifest'. Monosyllabic ideophones are characterized by a single long stressed syllable, sometimes abnormally long (written with double

vowels: e.g. bee 'of spreading'). The disyllabic ideophones, by far the most numerous, are characterized by a short, stressed initial syllable (e.g. cáBa 'of being flat'), differing from the normal situation in Zulu in which stress (nearly always penultimate) is accompanied by vowel length. Ideophones of more than two syllables also exhibit an initial short stressed syllable<sup>4</sup> e.g. phókotho 'of gulping down'.

From nearly all ideophones in Zulu true verbs may be derived. This can be accomplished in two basic ways: (1) by simply removing the final vowel of the ideophone and adding the appropriate verbal suffixes: e.g. bix- (verbal root) < bíxi 'of smearing, making a mess'; (2) by adding certain suffixes which are used specifically for the purpose of deriving verbs from ideophones. The most common of these suffixes are: -k-, usually for forming intransitive verbs: e.g. boncuk- 'slip out; be pulled apart' < bóncu 'of slipping out'; -l-, usually for forming transitive verbs: e.g. dlebul- 'tear off' < dlébu 'of tearing'; -z-, usually for forming verbs with causative meaning: e.g. dumuz- 'cause a booming sound' < dúmu 'of a booming sound'. A few causatives are formed by the addition of -s- rather than -z-: e.g. godus- 'send home' < gódu 'of going home'; -B-, added to monosyllabic ideophones (in addition to -l- and -z-) to form transitive verbs: e.g. zuB- 'deal a death blow' < zuu 'of dealing a death blow'; zwiB- 'fling; hurl' < zwii 'of flinging; hurling'.

In addition to these common verb-forming suffixes, there

are several others which are also found fairly frequently. These suffixes, however, have a less consistent function than the ones just given. These suffixes are: <sup>5</sup> -m-, for forming both transitive and intransitive verbs: e.g. babam- 'pounce on' < bába; badam- 'surprise' < báda; bozom- 'catch red-handed' < bózo; phuphum- 'overflow; bubble over' < phu (reduplicated); -mal-, often for forming intransitive verbs: e.g. fufumal- 'be bold' < fúfu; khukhumal- 'swell; expand' < khúkhu; -mez-, often for forming causative verbs: e.g. chukumez- 'prod; irritate' < chuku; xhakamez- 'treat disdainfully' < xháka; quikimez- 'nudge; prompt' < quíki; -mul-, often for forming intransitive verbs: e.g. bovumul- 'roar; growl' < bóvu. Bazimul- 'glimmer; flash' < Bázi; -Bal-, often for forming intransitive verbs: e.g. dunduBal- 'come out on top' < dúndu. nukuBal- 'be in a dirty state' < núku; -Bez-, often for forming causative verbs: e.g. nukuBez- 'make dirty' < núku; thikiBez- 'move; disturb' < thíki; -Bul-, for forming both transitive and intransitive verbs: e.g. gadaBul- 'bound along; gallop' < gáda; klekleBul- 'tear; rip; scratch' < kle (reduplicated).

Verbs derived from ideophones behave, in general, similarly (with respect to palatalization) to comparable forms in the first and third groups above. Thus, passives from verbs which have been formed directly from an ideophone whose final consonant is a bilabial (simply by removing the final consonant of the ideophone) behave like those in the first group, since the bilabial stop and the passive suffix -v- come into direct contact with each other: e.g. gvaB- < gváBa 'of a rumbling': pass. gvatshw-

On the other hand, passives from verbs which have been formed from an ideophone by the addition of one of the suffixes given above display the type of "optional" (or sporadic) palatalization which was found to exist for forms in the third group above, since they are not derived from a verbal form with a final bilabial stop (except if the verb-forming suffix is -m- or -B- (e.g. bavum- < bávu-m- :pass. bavunyw-) in which case, they become identical to forms in the first group, as far as palatalization is concerned): e.g. fotshelw-, pass. of foBel- 'gulp down' < fóbe; dumuzw-/dunyuzw-, pass. of dumuz- 'cause a booming sound' < dúmu; dwaBuzw-, pass. of dwaBuz- 'drag oneself weakly along' < dwaBu; datshulw-, pass. of daBul- 'tear; split down' < dáBu; cumbazw-/cunjazw-, pass. of cumbaz- 'finger; handle' < cúmba. In other words, even though these types of verbs are divisible into a simpler form whose final consonant is a bilabial plus a verb-forming suffix, the simpler form is an ideophone, not a verbal root or stem. The simplest verbal form from which these passives can be derived is that which consists of the ideophone plus the verb-forming suffix (e.g. foBelw-, pass. of foBel-, verbal form composed of the ideophone fóbe plus the verb-forming suffix -l-).

Thus, the question which arises concerning palatalization in forms of the above type is, as in forms in the third group, the possible motivation for this palatalization, since there is no simple verbal root or stem in a final bilabial to provide the model for palatalization at a distance. In other words, we should

return to the problem of palatalization occurring in what I will refer to for convenience as "non-derived" forms, where there is no simple stem (or model) to motivate its occurrence.

1.5 There is one very simple (and perhaps obvious) explanation which comes to mind and which the reader in all probability has already considered. This explanation would account for the palatalization of bilabial stops by simple straightforward analogy. That is, once bilabials started becoming palatals at a distance from the passive suffix -w- through an apparent desire to maintain one root or stem shape in the passive, the palatalization process ceased to be entirely phonetic and it might then seem to be a natural next step for bilabials in other passive formations to become palatals also, if only sporadically (or optionally). Palatalization at this point, then, would have become a sort of (at least optional) marker of the passive stem in forms with bilabial stops.

2.1 Although the above explanation seems plausible in that such an extension of a process as we find here with palatalization is common in languages, particularly after the process becomes (partly) morphologized, and although there is indeed analogy involved, the analogical process turns out to be much less simple than that suggested above and to have interesting restrictions on its operation.

Even though palatalization is of a very sporadic nature and pervades the language in this manner to a great degree, examination of nearly all verbal forms and ideophones given in

U and V has nevertheless resulted in the discovery of two types of exceptions to the palatalization of bilabial stops in passive formations.

2.1.1 The first type of exception which will be discussed is much more consistent and obvious than the other. This exception involves the initial consonant B- of the suffixes -Bal-; -Bez-; -Bul- which were illustrated in 1.4.4 above. These suffixes seem to (originally, at least) be combinations of simple suffixal morphemes which have become "fixed" in this new form for no apparent reason, and are added to ideophones usually simply for the purpose of deriving a verb, having no consistent or specific meaning attached to them. Thus, -Bal- appears to be a combination of the suffix -B- plus the extensive verbal suffix -al-, and -Bul-, a combination of -B- plus the (original, at least) reversive suffix -ul-. -Bez- appears to be the contracted causative of -Bal- (since derived verbs in -al- usually form their causatives in -ez-), although Bez-, like -Bal- and -Bul-, is often added to an ideophone seemingly for the sole purpose of deriving a verb, there being (no obvious) causative meaning and no related form with -Bal-. (cf. for example some of the forms given below).

With few exceptions (which turn out to be explainable), passive formations from verbs formed by means of these suffixes do not display palatalization of the bilabial stop -B-. e.g.  
húnguBalw-, pass. of húnguBal- 'be stiff; strain' < húngu;  
hóngooBalw-, pass. of hóngooBal- 'draw in the legs' < hóngoo;  
dendeBulw-, pass. of dendeBul- 'act in a lethargic manner' < dénde;



gadaBulw-pass. of gadaBul- 'bound along' < gada: nukuBezw-, pass. of nukuBez- 'make dirty', contracted causative of nukuBal- < ndku; thikiBezw-, pass. of thikiBez- 'move; disturb' < thiki: gwegweBezw-, pass. of gwegweBez- 'be evasive' < gwéwé.

We can place these examples in the third group discussed above, since they are forms which are not derived from a simple root or stem in a final bilabial consonant. Yet, these forms behave differently in that they do not show the sporadic (or optional) type of palatalization that was noted for other non-derived formations (i.e. those of the type in the third group and ideophones derived from verbs by means of a verb-forming suffix).<sup>6</sup>

As noted before, verbal formations with one of these suffixes are clearly segmentable into a simpler form (the ideophone) plus one of these suffixes (e.g. hungu-Bal-). Thus, as is the case for other verbs derived from ideophones, they are not of exactly the same type as those in the third group above, where no simple stem existed at all. They are similar, however, in that they are not segmentable into a simpler stem in a final bilabial plus another suffix (e.g. hungu-Bal-, not hungu-B-al<sup>7</sup>). One could claim, then, that it is the place where the -B- occurs which causes it not to palatalize, for it occurs in a clearly present, but non-segmentable, suffix, rather than in a completely non-segmentable verbal form. However, there are two other, very similar suffixes which do undergo palatalization frequently. These suffixes are -mal-; -mez-; -mul-. These suffixes, like

-Bal-; -Bez-; -Bul-, are very frequently added as a unit, that is, in many cases, it is possible to isolate a simple form (an ideophone) and a suffix -mal-; -mez-; -mul-, but not a stem ending in -m- and a suffix -al-: e.g. fudumal- < fudu-mal-. (No stem fudum- occurs). The suffixes -mal-; -mez-; -mul- are of particular importance in making a decision as to how to treat the failure of the -B- in -Bal-; -Bez-; -Bul- to palatalize, for the -m- of -mal-; -mez-; -mul- becomes a palatal quite frequently: e.g. dikinyezw-, pass. of dikimez- 'reject' < diki; bovumulw-/bovunyulw-, pass. of bovumul- 'growl' < bóvu; fufunyezv-, pass. of fufumez- 'be bold' < fúfu. Thus, the fact that -m- in these suffixes becomes a palatal in the passive provides evidence that the failure of -B- to palatalize in passive formations cannot be explained on the basis of its being a unit suffix.

In addition to the above evidence, there is another fact which helps confirm the conclusion that the failure of -B- to become a palatal is not due to its being part of a unit verbal suffix. There are in Zulu some verbal stems ending in Bez- which are derived from ideophones ending in Bezi, by dropping the final vowel of the ideophone: e.g. suluBez- 'take unawares' < súluBezi; shuluBez- 'dart about' < shúluBezi. Some such ideophones are derived from simpler ideophones by the addition of -Bezi, while others are not (synchronically, at least) derived. Passives of these types of verbs do not show palatalization of the B either, and since the B is not part of a verbal suffix here, such an explanation as that given above would fail to account for this part of the exceptionality.

2.1.2 The second type of exception involves certain other verbs derived from ideophones where we don't seem to find palatalization of bilabial consonants. These types don't represent such a significant group of exceptions as those just noted with -B-. The reason for this is that even though the forms show recurring final syllables, there aren't a great number of them. Nevertheless, bilabial stops contained in these types of formations do not undergo palatalization in their passive forms, and considering the frequent and sporadic nature of palatalization throughout the rest of the language, we might expect for there to be a few forms cited in D and V with palatalization. These exceptions are mainly of two types--  
 those forms ending in -lVnd- and those ending in <sup>x 7</sup>-lVc-.  
<sub>q</sub>  
 Many ideophones display vowel harmony throughout, and I have thus used V to represent any vowel (i.e. -lund-; -lond-, etc. and <sup>x</sup>-loc-; <sup>x</sup>-lac-; <sup>x</sup>-luc-, etc.): e.g. dluBulundw-, pass. of dluBulund- 'get out of control'; gwaBalandw-, pass. of gwaBaland- 'act in vain'; gomboloqw-, pass. of gomboloq- 'turn inside out; capsize'; gimbiliqw-, pass. of gimbiliq- 'gulp down a hard substance'.

2.2 Although it is ordinarily quite normal to find exceptions to nearly all types of processes occurring in languages, those just described are remarkably peculiar in view of the type of situation which appears to exist in Zulu. For, if palatalization of bilabial stops is simply a sporadic process, having spread by analogy to non-derived formations and thus occurring (more

or less) optionally in passive formations in general, it should affect all bilabials in approximately the same manner (that is, it should occur sporadically in all types of passive formations), and there should be no reason to expect any consistent exceptions of the type which apparently exist.

In addition, if palatalization has simply become a mark of passives (optionally, at least) for stems containing bilabial stops (thus being morphological, conditioned entirely by the passive suffix, rather than being a basically phonetic process), we would probably expect palatalization to have ceased being absolutely regular in forms of the first type discussed above, where the passive suffix is added directly to a root or stem-final bilabial stop. But, as noted above, palatalization occurs regularly in such cases, in both native and borrowed words.

3.1 These apparent restrictions on the occurrence of palatals in passive stems would seem, then, to point to the existence of more complicated factors at work than simple morphologization followed by "across-the-board" analogical extension.

Extensive investigation into these restrictions which were just noted reveals that palatalization cannot be said to simply apply (optionally) to bilabials in passive stems. It appears rather to apply only in stems which have a particular type of morphological structure. This will become clear if we compare the normal situation with regard to palatalization (that is, the forms in which palatalization occurs) with the two types of exceptions to the palatalization process.

3.1.1 It appears to be the case that nearly all passive forms in which palatalization occurs are of one of two basic types: either the form is segmentable into a simple form (a root or a stem) in a final bilabial stop plus one or more suffixes (i.e. what I have been calling the 'derived' formations), or the form is not actually segmentable into a simple form in a final bilabial stop plus one or more suffixes, but is of identical "possible" structure to a clearly derived form. Thus, a form such as babel-, although there is no root bab- found to be in use, is identical in form to numerous stems for which there actually exists an independent root plus the applied verbal suffix -el-. Similarly, a form like bavumel- has no corresponding simpler stem bavum-, yet it appears that it is composed of an ideophone bavu, the verb-forming suffix -m-, and the applied verbal suffix -el-. Such forms then can very easily be felt to be segmentable after the bilabial: i.e. bab-el-; bavu-m-el-, making them very much like forms which actually are derived, where the root or stem-final bilabial stop comes into direct contact with the passive suffix -w-, becoming a palatal and creating a "passive stem" which can then serve as a model for passives of derived verbs.

At this point, it should be explained how verbs derived from ideophones by the addition of a verb-forming suffix fit into the analogical type of palatalization just described. It will be recalled that these types of verbal formations consist of

an ideophone whose final consonant is a bilabial stop rather than a verbal root or stem in a final bilabial stop. They are, then, similar to actual non-derived formations (as far as palatalization is concerned), and being similar in this latter respect to non-derived formations, palatalization in these forms containing ideophones can be explained through a type of analogy similar to that proposed for the actual non-derived formations. As noted earlier, verbs can be derived directly from ideophones by simply removing the final vowel of the ideophone. In some cases, of course, these ideophones have final bilabial stops. Once these ideophones become actual verbal forms, the bilabial of course becomes a palatal in the passive (e.g. gwaB < gwaBa: pass. gwatshw-). Thus, even if the ideophones in the types of verbal formations being presently considered do not exist independently as verbs, they are of the same type as those that do have independently existing verbal forms, and can therefore serve as a "possible" model for palatalization in the passives of verbs derived by means of a verb-forming suffix, in the same way that the "possible" verbal roots or stems discussed above can serve as a model. For example, a form such as foBel-, derived from the ideophone foBe plus the verb-forming suffix -l-, doesn't happen to have corresponding to it another verbal form foB-, formed by the other means of deriving verbs from ideophones. (At least, there is no such form given in D and V). However, other, similar forms, such as gwaBaz-, derived from the ideophone gwaBa plus the verb-forming

suffix -az-, does have a corresponding verbal form yaB formed by the other derivational process. Since a form like yaB can then serve as the necessary model for palatalization in passives of other verbal derivatives containing that basic form (e.g. yaBaz-), a formation like foDel- can easily be felt to contain a "possible" verbal stem foD- thus providing a possible model for palatalization.

In addition to the above, I would like to add that it appears to me that verbs are derived quite freely from ideophones by simply removing the final vowel of the ideophone and are then used more or less interchangeably with the verbs derived by means of a verbal suffix. This would make the feeling of a "possible" verbal stem even stronger, and I suspect that failure to list such a form in the dictionary does not necessarily mean that it isn't in use (by some speakers some of the time). (Of course, the only way this feeling could be tested is by consulting a native speaker).

In order to present a clearer picture of how "non-derived" formations can be felt to consist of the type of morphological structure relevant to palatalization, a variety of examples follow showing the "possible" morphological break-down in relation to analogous derived formations:

dadambal 'delay in giving birth' : dadambal- (verbal root plus extensive suffix) or dadamba-l- (ideophone plus verb-forming suffix).

dambuluk- 'flow slowly downwards' : dambuluk- (verbal root

plus reversive suffix) or dambu-l-uk-<sup>8</sup> (ideophone plus verb-forming suffix plus reversive suffix).

dleBelek- 'talk or cry uncontrolledly' : dleBe-l-ek- (ideophone plus verb-forming suffix plus neuter suffix) or dleB-el-ek- (verbal root plus applied suffix plus neuter suffix).

diphaz- 'act blindly': dipha-z- (ideophone plus verb-forming suffix).

dlozomel- 'pounce upon' : dlozo-m-el- (ideophone plus verb-forming suffix plus applied suffix).

BaBel- 'burn off grass' : BaB-el- (verbal root plus applied suffix) or BaBe-l- (ideophone plus verb-forming suffix).

guBukul- 'uncover' : guB-ukul- (verbal root plus reversive suffix) or guBu-k-ul- (ideophone plus verb-forming suffix plus reversive suffix).

Bamazel- 'act absentmindedly' : Bama-z-el- (ideophone plus verb-forming suffix plus applied suffix).

jokomez- 'scold vehemently' : jokome-z- (ideophone plus verb-forming suffix) or joko-m-ez- (ideophone plus verb-forming suffix plus contracted causative).

jojomezel- 'give an angry look' : jojome-z-el- (ideophone plus verb-forming suffix plus applied suffix) or jojo-m-ez-el- (ideophone plus verb-forming suffix plus contracted causative plus applied suffix).

phapham- 'wake up; be awake' : phaph-am- (verbal root plus stative suffix) or phapha-m- (ideophone plus verb-forming suffix).

dlemuzel- 'walk briskly' : dlemu-z-el- (ideophone plus verb-



forming suffix plus applied suffix).

xabelel- 'involve in trouble' : xab-elel- (verbal root plus perfective suffix) or xabe-l-el- (ideophone plus verb-forming suffix plus applied suffix).

nyukumal- 'swell by moisture' : nyuku-m-al- (ideophone plus verb-forming suffix plus extensive suffix) or nyuku-mal- (ideophone plus verb-forming suffix).

Bazinul- 'glimmer; flash' : Bazi-m-ul- (ideophone plus verb-forming suffix plus reversive suffix) or Bazi-mul- (ideophone plus verb-forming suffix).<sup>9</sup>

3.1.2 Turning our attention now to the two types of exceptions to the palatalization process which were discussed in 2.1.1 and 2.1.2 above, we can begin by comparing the types of formations in which the exceptions occur with those just discussed in which we find the "normal" situation with regard to palatalization.

Recall that the first type of exceptions discussed involved suffixes with initial -B- (-Bal-; -Bez-; -Bul-). As noted above, these suffixes appear to be very similar to those with initial -m- (-mal-; -mez-; -mul-). Both seem to be (original) combinations of the same suffixes (that is, verb-forming suffixes plus the verbal suffixes -al-; -ez-; -ul-) and usually have as their sole function the derivation of verbs from ideophones. As we have seen, however, the m of these latter suffixes is often found in its palatalized form, ny, in passive formations (e.g. fudunyezv- < fudumez-), falling under the usual sporadic type of palatalization characteristic

of "non-derived" formations. I suggested in 3.1.1 that palatalization in the "non-derived" types of formations might find explanation on the basis of structural analogy--that is, similarity to structures whose passives actually contain a simpler verbal form in a final bilabial and thus have a natural basis for palatalization in passive formations. Formations with the suffixes with initial -m- (given above) fall nicely into such an explanation, for superficially they are identical to verbal formations which are composed of an ideophone plus the verb-forming suffix -m- plus a verbal suffix like -al-, -ul-, -ez- (e.g. bavumul- < bavu-m-ul-), thus providing a "possible" passive form which contains a verbal stem in a final bilabial (e.g. Bazimul- < Bazi-mul- contains the "possible" segmentation Bazim-ul-\* (< Bazi-m-ul-\*), just like bavum-ul- (< bavu-m-ul-).

These "possible" segmentations are further motivated by the fact that many verbal suffixes in Zulu have (at least partially) lost their original meaning and, in many cases, appear to be added to a verbal root or stem simply to form another verbal stem, sometimes with a slight (or no) difference in meaning (e.g. bavumul- 'growl; roar; rage' < bavum- 'growl; roar' < bávu). Thus, a form like Bazimul-, although it is actually composed of an ideophone Bázi plus the suffix -mul- can easily by felt to consist of the "possible" segmentation Bazi-m-ul-, since (in general) no (consistent) particular meaning is associated with either type of segmentation. Comparing now the situation just described to that of the

suffixes with initial -B-, we find an important difference. The suffixes -Bal-; -Bez-; -Bul-, just as those with initial -m-, might be felt to be divisible into a suffix -B- plus the verbal suffixes -al-; -ez-; -ul-, all of these suffixes being also in use independently in the language. However, such a segmentation would be impossible for the following reason. Although -B- is a verb-forming suffix, it is added only to monosyllabic ideophones to derive verbs. Thus, a form such as dondoBal- could never be felt to have the "possible" segmentation dondo-B-al-\*, since a verbal stem like dondoB-\* (< dondo-B-) is not possible in Zulu, because it contains an attested ideophone of more than one syllable (dóndo). The fact that there is no analogous structure (to serve as a model) with a segmentation such that the bilabial could be a "possible" stem-final consonant apparently prevents palatalization of the B in these suffixes.

It should be noted, however, that if an entire formation in final -Bal- is a non-derived one, palatalization could occur (and sometimes does), for then the form would be analogous to others which simply have a root or stem-final -B- plus a verbal suffix (e.g. sunguBal-, for which a "possible" segmentation could be sunguB-al-\*, similar to forms like enaBal- < enaB-al-. sunguBal- has alternate passive formations (sunguBalw-/sungutshalw-), which is representative of one of the "normal" situations for "non-derived" formations).

The other type of exceptions to the proposed restrictions

on palatalization , namely, those forms ending in lVnd- and lVc-<sup>x</sup>, lend themselves to a similar explanation as that just proposed for the other type. As stated before, the former are nearly all non-derived, even though the finals .lVnd- and lVc-<sup>x</sup> recur fairly frequently. Thus, they are what can be termed recurring finals, but not actual suffixes. Again here, then, there would be no feeling for a "possible" segmentation immediately to the left of these finals (e.g. dluBu-lund-\* or gimbi-liq-\*), since there is no productive model on which to base such a segmentation; for although the material to the left could be a "possible" verbal root, that to the right is not a "possible" suffix in Zulu. Even if we tried to segment the material to the right into smaller "possible" parts, we wouldn't succeed. The l in both cases could of course be considered to be the verb-forming suffix which is added to ideophones. The material to the right of the l in both cases, however, is not a suffix of any sort in Zulu, and thus, for the purposes of this discussion we can say that lVnd- and lVc-<sup>x</sup> are not "possible" suffixes.

It seems, then, that palatalization can occur in "non-derived" formations only if a "possible" segmentation could occur immediately after the bilabial stop. In other words, the bilabial and everything to the left of it have to constitute a "possible" stem in the language, and the material to the right has to be a "possible" suffix of the language.

Thus, although analogy is indeed responsible for the

occurrence of palatalization in "non-derived" formations, it has not caused this process to spread in an across-the-board fashion, causing it to become what we could call a marker of the passive stem. Rather, analogy has caused the spread of palatalization in a much more well-defined manner in complete accordance with the actual morphemic structure of the language--that is, in accordance with what is felt to be a "possible" stem and suffix in the language.

The above analysis also provides a plausible explanation for the regularity with which palatalization occurs when the bilabial stop and the -w- are contiguous; for, it appears now that palatalization actually does have a phonetic basis and that it has been extended out of its phonetic environment only when the phonetic environment is present in the simple stem (that is, in derived formations, when a simple stem in a final bilabial stop exists as a model) and in "non-derived" formations of a structure such that they contain a "possible" phonetic environment--that is a "possible" stem in a final bilabial and one or more "possible" suffixes.

3.2 Before leaving the discussion of these exceptions, it is interesting to note that I have not yet found any of what I would call actual counterexamples to the restrictions which I have proposed on the analogical extension of palatalization to "non-derived" forms.

There do exist a few forms in which B becomes a palatal when, according to the proposed restrictions, it should remain B.

However, these few forms turn out to be explainable by basically the same sort of analogy which is responsible for the general conditions on palatalization which have been discussed in this paper.

One apparent exception is the verbal form xaxaBul- 'belabour; flog', which is related to the simpler verbal form xax- 'punish by beating; flog'. The passive form displays a palatal: xaxatshulw-. Both verbal forms with xax- appear to have been derived originally from an ideophone xáxa\* (although it is apparently not presently in existence), which was made into a verb in both available ways--that is, by the addition of a verb-forming suffix (-Bul-) and by simply removing the final -a of the ideophone. However, palatalization presupposes a "possible" stem xaxa-B-, and, as we have seen, this wouldn't be possible, since -B- is added only to monosyllabic ideophones. It is very common in Zulu, however, for monosyllabic ideophones to reduplicate, and many verbal forms are made from these reduplicated ideophones (e.g. bubul- < the ideophone bu). Thus, a form like xaxaBul-, even though there is no attested ideophone xa\* or xáxa\* presently in the language, could easily be felt to consist of an ideophone xa\* which has been reduplicated. Since -B- can be added to monosyllabic ideophones, a stem like xa-B- would be permissible. (This "possible" stem xa-B- would, then, be analogous to the many actually occurring stems like it: e.g. zwi-B- 'swing to and fro'; zu-B- 'deal a death blow', from the ideophones zwii and zuu respectively).

A similar explanation could be proposed for the form gogoBal- 'crouch in a corner' < gogo-Bal- ( < gógo), which has the alternate passive formation gogotshalw-. That is, although no monosyllabic ideophone go\* is attested, the form looks as if it could have been derived from go-B-\*, with reduplication of the ideophone.

Another apparent exception is the verbal form gadlaBez- 'bump metal noisily', derived from the ideophone gádla 'of striking , as against iron', and having a palatal passive, gadlatshezw-. Since gádla is an actually occurring ideophone and is polysyllabic, an analogical segmentation gadla-B- is, of course, not a possibility. There is, however, a form gadlamez-, with the same meaning as gadlaBez-, and derived from the same ideophone, gádla. gadlamez- has a palatal passive gadlanyez-. The palatal in the passive of gadlaBez- could thus be due to its great similarity to gadlamez-.

4.1 If the analysis presented in this paper represents even an approximation to a correct explanation of the phenomenon of palatalization in Zulu, a logical question to pose would be what factors, if any, would need to be present in a language to cause such a situation; for, even though analogy frequently causes non-derived formations to behave like those which clearly undergo productive derivational processes, the situation in Zulu seems much more extreme than that normally found in languages. That is, the analogical processes involved here seem to be sensitive to a much more exact structural similarity

--not only do "non-derived" verbal formations have to be superficially the same as those which are derivable (i.e. they have to be passives containing a bilabial), they have to be able to be segmented in exactly the same way as derived formations

4.2 Explanation of the situation which has been described would seem to me to lie (in part, at least) in the basic nature of the morphological system: Although its complexities go far beyond the scope of this paper and, in many aspects, beyond my understanding at this point in my investigation, a brief discussion at this point would seem to be in order.<sup>10</sup>

It appears to be the case that, although many verbal suffixes and verb-forming suffixes (i.e. those added to ideophones to derive verbs) are still in frequent use and are quite productive, having a particular meaning or function associated with them, it nevertheless also appears to be the case that many suffixes, regardless of their otherwise productive status in the language, are found frequently in obviously derived formations often with no apparent consistent accompanying meaning. Similarly, as noted several times earlier, (apparent) combinations of suffixes are often found attached to verbs and ideophones, again with no apparent consistent meaning attached to them.

Thus, since many of these suffixes are used frequently both in particular functions and simply for deriving separate verbs (from verbs and from ideophones), when verbal forms occur which (synchronically, at least) are not derivable--that is,



which don't have simpler roots or stems occurring independently in the language--it seems quite natural to be able to equate them to other verbal forms to which they are identical in form and to treat them in identical fashion with regard to phonological processes of the language, in much the same manner as that described in connection with different (possible) segmentations of the suffixes -mal-; -mez-; -mul- (cf. 3.1.2 above). Since the language makes use of a very limited number of affixes, and adds these in so many different combinations, often with no apparent meaning attached, it seems quite natural also that so many forms would have come to exist which are no longer derivable in terms of isolating a root and one or more suffixes. These "non-derived" forms then have in common with the derived formations the characteristic that their "possible" suffixes may or may not display a particular function. Following are a few examples of derived formations in which the suffixes have no apparent meaning  
 11  
 associated with them.

Beshezel- 'walk with the head nodding through tiredness'

< Béshe (-zel-, verb-forming suffix, which is apparently an (original) combination of suffixes).

bethuz- 'wander about' < béthu (-z-, causative verb-forming suffix)

Bindan- 'be congested' < Bind- 'choke, obstruct breathing' (-an-, reciprocal suffix).

klamuzel- 'eat unripe fruit; be crisp' < klamuz- < klámu. (-z-, causative verb-forming suffix; -el-, applied suffix).

kopel- 'lash round; hook' < kop- 'pick out (as from a hole)'  
(-el-, applied suffix)

kukuzel- 'cluck, call together' < kúkuz- 'cluck, call together'  
< kúku (-z-, causative verb-forming suffix; -el-, applied suffix).

sekez- 'walk with a waddling gait' < séke 'of walking with a  
waddling gait' (-z-, causative verb-forming suffix). (cf. also  
sekezel-, with identical meaning).

babam- 'pounce on' < bába 'of pouncing on' (-m-, verb-forming  
suffix). also: babamel- 'pounce on' < babam-(-el-, applied  
suffix).

hlambulul- 'clarify; make thin; < hlamb- 'wash; swim'  
(-ulul-, alternate reversive suffix).

hlengelel- 'help; sustain' < hleng- 'assist; help' (-elel-,  
perfective suffix).

hliBith- 'grin' < hliBi 'of grinning' (-th-, contactive suffix).

hoBan- 'be in an anxious state' < hóBa 'lie in wait; be anxious'  
(-an-, reciprocal suffix)

hoshekel- 'draw back' < hosh- 'draw out; pull out' (-ek-,  
neuter suffix; -el-, applied suffix).

potokal- 'give under pressure' < potok- 'yield to pressure'  
< póto (-k-, verb-forming suffix; -al-, extensive suffix).

gakulis- 'joke with; argue with' < gáku 'of joking' (-lis-,  
apparent combination of -l-, verb-forming suffix, plus -is-,  
causative suffix).

qaqulul- 'rip open' < qaq- 'rip up; rip open' (-ulul-, reversive  
suffix).

geketh- 'chatter; gossip' < géke 'of chattering' (-th-, contactive suffix).

5.1 In summary and conclusion, the analysis which has been presented in this paper seems to me to logically account for the way in which palatalization operates. If palatalization is basically a phonetic process and occurs at a distance only when it can serve to maintain identity of a particular passive stem or if the form has a structure which is identical to those in which palatalization can serve to maintain this identity, it is not totally unreasonable that it occurs in the manner which has been described in this paper.<sup>12</sup> If, however, we were to maintain that palatalization has become a morphological marker of the passive and is conditioned by the existence of the passive suffix, there are several characteristics of this process which are unexplainable (or at least, quite peculiar): First, as already thoroughly discussed (cf. 2.1 above), the restrictions on palatalization are unexplainable; secondly, a process which is as limited as palatalization (palatals deriving from bilabials only) probably would not be expected to be extended as a marker of a category; finally, even if palatalization actually did become a marker of the category, it would seem quite peculiar for it to take place in such a sporadic manner. We would expect it rather to have become more regular as it spread to non-derived formations, not more sporadic, as seems to be the case.

However, it does not seem unreasonable that analogical

extension of a process on the basis of identity with forms in which the process can serve a particular purpose (i.e. identity of the passive stem) would indeed be somewhat sporadic, since in "non-derived" formations, the (simple) stem which would be the basis for palatalization does not actually occur independently in the language.

## Footnotes

<sup>1</sup> I would like to thank the Research Board of the University of Illinois for a grant (awarded to Charles W. Kisseberth and Michael J. Kenstowicz) which, in part, made this research possible.

<sup>2</sup> The one exception to this is passive reciprocals (or strictly speaking, reciprocal passives), where -wan- rather than -anw- usually is found. Occasionally, however, both forms occur, with no apparent difference in meaning: e.g. Bonanw- or Bonwan- 'be seen by one another', and rarely, forms with -anw- only are found.

<sup>3</sup> an asterisk to the right of a form indicates a non-occurring form or type of form.

<sup>4</sup> In order to clearly indicate that a form is an ideophone, and to distinguish its abnormal stress, I will follow the practice used by Doke and Vilakazi and mark an acute accent over the first vowel of all ideophones of more than one syllable.

<sup>5</sup> I will not give a separate definition of ideophones in these and later examples, since the way in which their meaning is related to the derived verb was illustrated in the last group.

<sup>6</sup> Recall that I refer for convenience to all formations which contain a bilabial stop which isn't the final consonant of an attested verbal root or stem as "non-derived" formations.

<sup>7</sup> x, q, c are orthographical representations of three click sounds in Zulu: x represents a voiceless lateral click; q represents a voiceless alveol-palatal click; c represents a dental click.

<sup>8</sup> The reversive suffix has several variants: -ul-; -uk-; -ulul-; -uluk-.

<sup>9</sup> The last two forms above are actually derived in each case from an ideophone plus -mal- and -mul-, and thus, as noted earlier, actually fall into the third group of formations--non-derived in the sense that they don't consist of a simple verbal root or stem in a final bilabial. However, they look

identical to forms which are actually derived by means of the verb-forming suffix -m-, with other verbal suffixes then added.

<sup>10</sup> Parts of the following discussion were touched on briefly in 3.1.2 above.

<sup>11</sup> I have given, in each case, the "normal" function associated with the suffixes.

<sup>12</sup> Howard (1972) analyzes palatalization at a distance as a strictly phonetic process involving several assimilation and dissimilation processes. It is a very brief discussion and does not take into account any related factors existing in the language. Since, it appears to me that without considering all of these facts, one cannot even begin to decide on a correct manner of description, I saw no reason to discuss his analysis in the text.

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#### Errata

pg. 146, ln.6, belabial, read bilabial

pg. 146, ln.16, belabial, read bilabial

pg. 155, ln.20, fóbe, read fóBe



ANOTHER PRETEND PAPER

Marc Rosenberg

The lexical item pretend has received considerable attention in linguistic literature (Lakoff 1970, Karttunen 1970a), probably running a close third to remind and kill. This attention is due to the fact that pretend seems to be the only English lexical item (along with the synonymous make believe and the archaic and synonymous feign) which is "counterfactive." It seems that the complement of pretend must be untrue. The exact relationship between pretend and its complement is the subject of controversy. In a paper entitled "The 2<sup>3</sup> Surface Verbs pretend," Paul Neubauer makes the claim that speakers vary in their interpretation of pretend systematically according to three parameters, and these parameters combine to form eight distinct dialects. In this paper, I will discuss my attempt to verify Neubauer's claim by submitting sample sentences to informants. As I personally conducted interviews lasting from fifteen to twenty minutes with the informants, I could not hope to collect sufficient data to yield eight distinct dialects. I set the more limited goal of finding systematic variation according to the three predicted parameters.

The discussion in this paper is based on data gathered by orally presenting 34 sentences and 3 situations to 33 informants. The exact details of the interview appear in the Appendix. Although the type of variation I was looking for is not supposed to correlate with geography or social class, my sample included people from the East Coast, West Coast, the Midwest, a Canadian and a Londoner. It included undergraduates, graduate students in linguistics and in other fields, faculty members, a high school senior, a thirteen year old, and others. There are 22 females and 11 males in the sample. The sample is definitely "biased" in that the informants are on the average much more educated than the general population.

1.  $\sim$ S vs.  $\sim$ T(S)

The first parameter of variation predicted by Neubauer concerns presupposition in sentences with a factive verb embedded under pretend. A crucial sentence that is supposed to reveal this variation is

(1) Max pretended that he realized he was sick.

For some speakers, (1) presupposes that Max really was sick. For these speakers, (1) probably yields an "intermediate stage" like

(2) Max didn't realize he was sick.

and from (2) they conclude that Max was sick. For other speakers, (1) doesn't presuppose anything about Max's health. Neubauer, drawing on a suggestion to George Lakoff by Bas van Fraassen, suggests that for these speakers (1) yields something like

(3) It is not  $\left\{ \begin{array}{l} \text{true} \\ \text{the case} \end{array} \right\}$  that Max realized he was sick.

The two interpretations are represented as  $\sim$ S (for the dialect with the presupposition) and  $\sim$ T(S) (for the dialect with no presupposition).

In my discussion of sentence (1) with people before I actually started to systematically collect data, it became apparent that realize caused exceptional difficulty and often people could assign no meaning at all to (1). Extreme difficulty with realize was encountered throughout the data gathering, and I have no conclusive explanation as to why this one verb is more difficult than other factive verbs. The verbs I used in the questioning are: know, see, find out, forget, resent, and realize. In addition to including sentences with these verbs embedded under pretend, I included these verbs embedded under pretend and within the scope of negation. The motivation for this was an asymmetry I observed in my own dialect. For me, certain factive verbs have no presupposition in the affirmative but do have a presupposition in the negative.

No Presupposition:

(4) John pretended that he knew that Mary was guilty.

(5) John pretended that he saw Sam take the file.

(6) John pretended that he had found out that Sam spilled the syrup.

Presupposition:

(4') John pretended that he didn't know that Mary was guilty.

(P: Mary was guilty.)



(5') John pretended that he didn't see Sam take the file.

(P: Sam took the file.)

(6') John pretended that he hadn't found out that Sam spilled the syrup.

(P: Sam spilled the syrup.)

It turns out that 2/3 of the informants uniformly exhibit this asymmetry. These speakers fit into Neubauer's  $\sim T(S)$  dialect since they have no presuppositions for (4) - (6). But what about the other 1/3 of the informants?

According to Neubauer's predictions, the other speakers should all judge sentences like (4) to have presuppositions like (7):

(7) Mary was guilty.

But this is not the case. I had some informants who gave me presuppositions such as (7) for (4), but they had "negative presuppositions" for other sentences. In other words, (5) above was said to presuppose (8):

(8) Sam didn't take the file.

There were some informants who had presuppositions for some sentences, but no presuppositions for others. The actual data is given in the table below. Each horizontal line represents an individual speaker. The relevant sentences here contained the verbs: KW - know; SE - see; FO - find out; DC - discover.

	<u>Affirmative Presupposition</u>	<u>Negative Presupp.</u>	<u>No Presupp.</u>
	FO	KW,SE,DC	
	KW,DC		SE,FO
	KW,FO,DC		SE
	KW,FO		SE,DC
	KW	SE,FO,DC	
	KW,SE,FO		DC
	KW,SE,FO,DC		
	FO		KW,SE,DC
	SE,FO,DC		KW
	FO		KW,SE,DC
	(?) DC <sup>1</sup>	SE	KW,FO
		FO,DC	KW,SE
	KW-6	KW-1	KW-5
	SE-3	SE-3	SE-6
	FO-8	FO-2	FO-2
	DC-4 (or 5)	DC-3	DC-4
TOTALS			

Table 1

There is only one speaker who unequivocally fits into the ~S dialect. Before I discuss the above results, I will give the rest of the data.<sup>2</sup> The verbs not mentioned so far are forget, regret and resent. For myself and for every other informant these verbs always had affirmative presuppositions. There is no asymmetry here between affirmative and negative. Every single speaker had the judgments:

(9) John pretended that he forgot that Sheila was a relative.

(P: Sheila was a relative.)

(10) John pretended that he resented Harry's leaving a tip.

(P: Harry left a tip.)

(11) John pretended that he regretted that he had behaved inappropriately.

(P: John behaved inappropriately.)

Another uniformity among all speakers was that verbs in the complement of pretend under negation (i.e. even the speakers in the above table for the verbs appearing in sentences like (4') - (6') ) always had affirmative presuppositions. In the entire data there are one or two deviant judgments of sentences with negative complements, which may be attributed to error.

The intriguing question posed by the above table is how is it that identical sentences elicited positive presuppositions for some speakers and negative presuppositions for others; more interesting still is that there were individual speakers with negative presuppositions for some sentences and positive presuppositions for other sentences where a difference in verb was probably crucial. The table does not reveal any systematic distribution based on the choice of verb, and I don't feel that verb choice is the most important factor in explaining the data. There definitely are differences in factive verbs though as evidenced by 100% of the informants getting affirmative presuppositions with regret, resent, and forget and 66% getting no presuppositions with another group of verbs.

In making judgments about sentences, people usually try to fit the sentences into some context or situation based on their experience using the language. It is probably impossible to make a judgment about a sentence taken apart from a context. It is not difficult to imagine

two settings that would yield opposite presuppositions for the same sentence. Consider:

(12) John pretended that he saw Sam take the file.

- a. John dislikes Sam and wants to get him in trouble. Sam didn't take the file, but John is going to pretend that he saw him take it in order to get him in trouble.
- b. It is advantageous to John, for some reason, for people to believe that he saw Sam take the file. (Imagine a witness perjuring himself in court.) Sam really did take the file but John did not witness it. For his own benefit, John pretends that he did see Sam take the file.

An informant's coming up with a context like (12a) or (12b) would determine whether he would establish an affirmative or negative presupposition. Why particular verbs conjured up different types of contexts for the informant is a mystery that probably cannot be solved. I feel that there is slight evidence that context imagining accounts for the data in Table 1 in the behavior with find out. Of the four verbs know, see, find out, and discover, find out seems to be the least neutral and the most "semantically loaded." Therefore, it is most likely to evoke a specific context. In the table, find out evoked presuppositions more frequently than the other three verbs. Why find out evoked an affirmative presupposition much more frequently than a negative presupposition is an unanswered question. The kind of imagining that some of the informants did can be seen in a comment that I recorded. When presented with the sentence

(13) John pretended that he had found out that Sam spilled the syrup.  
the informant responded

(14) Sam didn't spill the syrup. How else could John have pinned it on him?

The crucial linguistic question that must be answered is whether speakers do have different representations for pretend corresponding to Neubauer's  $\sim S$  and  $\sim T(S)$ . The work with the informants leads me to believe that this difference does not exist. For one thing, some speakers who are part of the 2/3 getting no presuppositions began with presuppositions and later asked if they could go back and change their mind. Some speakers changed their judgments to "no presuppositions"

when I went back over the first few sentences after they had judged all 34. Some speakers who did get presuppositions had difficulty deciding between affirmative and negative presuppositions. Some volunteered that they were much more certain about their judgments with forget and with negatives in the complement. To some of the speakers getting presuppositions, I presented the following neutral context:

- (15) John is not sure whether Mary is guilty, but he thinks she might be. He decides that he will behave as if he is certain that she is guilty in order to see what her reaction is. Perhaps her behavior will give him evidence one way or the other. Therefore,

John is pretending that he knows that Mary is guilty.

All agreed that this was certainly a possible context for the sentence, but went on to explain that their own reaction was their first reaction and the reaction they would have if they actually heard the sentence. A completely subjective evaluation of the sophistication of the informants leads me to believe that the less sophisticated informants got presuppositions. All of the linguistics graduate students except one were among the 66% having no presuppositions.

Putting aside the fact that only one speaker perfectly fit into the ~S dialect, maintaining two different effects of pretend would create problems for explaining the behavior of the majority of speakers. For the majority of speakers, certain verbs gave presuppositions and others did not:

- (16) forget, resent, regret

John pretended that he forgot that Sheila was a relative.

(P: Sheila was a relative.)

- (17) know, see, discover, find out

John pretended that he discovered that James took the sulfur.

(No Presupposition)

For these speakers, we would have to say that pretend is interpreted as ~S for some embedded verbs and as ~T(S) for others. The difference is not a difference between speakers, but a difference within individual speakers. The difference in interpretation seems to me to be the effect of the embedded verb itself and not a difference in interpreting pretend.

A hypothesis that seems worthy of entertainment as to why realize causes so much difficulty is that realize might be right on the border between the two groups above.

Maintaining a distinction between  $\sim S$  and  $\sim T(S)$  also runs into problems accounting for the negative complement sentences. I really am not sure what the two representations for negative complements would be, but on analogy to the affirmative complements I suggest

(18) John is pretending that he didn't see Sam take the file.

a. John NEG didn't see Sam take the file.

b. It is NEG true that John didn't see Sam take the file.

The important point is that every single speaker comes to the conclusion that Sam took the file after hearing (18). Both negatives seem to combine to form a positive factive sentence:

(19) John saw Sam take the file.

There are no speakers who come up with a representation (probably 18b) yielding no presupposition. The strangeness of both (18a) and (18b) suggests that a notion such as "opposite" might be better than "negative" to explain pretend.

In support of his  $\sim S$  and  $\sim T(S)$  dialects, Neubauer predicts correlations in judgments between certain sentences. The first set of correlations involve sentence such as

(20) It is not { true  
the case  
so } that Ed { regrets  
has found out  
realizes } that the  
earth is flat.

(21) Ed is pretending that he { regrets  
has found out  
realizes } that the earth is flat.

Any given speaker is supposed to have the same judgments for the various factive verbs in both contexts. Neubauer, in his discussion, begins with the assumption that both sentences are ungrammatical with regret if one believes that the earth is a sphere. I did not want to start with this assumption and told my informants that they could be very imaginative in inventing contexts for the sentences. As this instruction held for both sentences, this should not have any effect on the prediction

that judgments will be the same in both contexts. The results are

Number of Informants Judging S's to be *		
	In Context (20)	In Context (21)
REALIZE	8	6 <sup>3</sup>
REGRET	17	12
FIND OUT	3	2
DISCOVER	0	1
FORGET	15	17
KNOW	6	2

Table 2

While the figures do conform to Neubauer's prediction in that they show a general trend, in the sample of 33 informants there were only 14 who had identical judgments in both contexts. Of these 14, seven found all the sentences to be completely acceptable. Of the remaining seven, four were completely consistent and found regret and forget unacceptable in both contexts. The other three were completely consistent but found other verbs unacceptable.

Neubauer's other prediction involves correlation of sentences like (21) with judgments of sentences like (4) - (6). Speakers who get no presuppositions for sentences like (4) - (6) will find the sentences of (21) acceptable. This is perhaps more easily understood from the opposite point of view. A person who reasons

(22) John pretended that he found out that Mary was guilty.

John didn't find out that Mary was guilty.

Mary was guilty.

will also reason

(23) Ed is pretending that he has found out that the earth is flat.

Ed has not found out that the earth is flat.

The earth is flat.

Since this conflicts with real world facts, the S is \*.

The data that I obtained is in the following table.

	In Sentence (21)		In Sentences like (4) - (6)	
	OK	*	No Presupp.	Presupp.
REALIZE	25	6	17	11
FIND OUT	31	2	23	10
REGRET	21	12	1	32
FORGET	16	17	0	33
DISCOVER	32	1	25	7
KNOW	31	2	25	7

Table 3<sup>4</sup>

The most dramatic results obtain with regret and forget. While there is almost unanimous agreement that these verbs form presuppositions in sentences like (4) - (6), about 50% of the informants find forget acceptable in (21) and about 66% find regret acceptable in (21). According to the reasoning in (22) and (23) this should not be the case. But to be fair to Neubauer, we must not consider forget and regret since Neubauer makes no predictions about them as he begins by assuming them to be ungrammatical in (21). His prediction should hold though for the other four verbs in the table. If his prediction turned out to be completely true, the figures in both left hand columns would be identical to each other and the figures in both right hand columns would be identical to each other. The greatest discrepancy is with realize, and we have already noted the difficulty it causes in forming judgments. The figures do show a general trend toward Neubauer's prediction, but they are not as supportive as those in Table 2 for the other prediction. In the sample there were three informants whose judgments were completely opposite to Neubauer's prediction.

## 2. Entailment vs. Presupposition

The second of the three parameters along which speakers are supposed to vary concerns the logical relationship between pretend and its complement. For most speakers this relationship is entailment, but for a minority of speakers it is presupposition according to Neubauer. The standard definitions of entailment and presupposition are used:

- (24)  $S_1$  presupposes  $S_2$  iff whenever  $S_1$  is true,  $S_2$  is true, and whenever  $S_1$  is false,  $S_2$  is true.

$S_1$  entails  $S_2$  iff whenever  $S_1$  is true,  $S_2$  is true.

Neubauer claims that a simple sentence and its negation is sufficient to test speakers on this relationship:

- (25) a. Sam is pretending that the earth is a sphere.  
b. Sam is not pretending that the earth is a sphere.

For Neubauer, (25a) is ungrammatical and the crucial test is (25b). For speakers who have the presupposition relationship, the negative will make no difference (as in the definition above) and they will

judge (25b) ungrammatical. Most speakers, who only have the entailment relationship, will find it acceptable. With my informants I used three sentences of obvious fact:

(26) a. Carol is pretending that the earth is a sphere.

b. Carol is pretending that grass is green.

c. Carol is pretending that London is in England.

and their negation. I instructed the subjects to consider them facts (to ignore that the earth is slightly egg shaped, that there is a London in Canada, etc.) and I was especially careful to insist on a generic reading for grass is green. The informants generally had the same feelings about all three sets of sentences. Since my informants were under instructions to decide whether there was any possible context for the sentences, there was no a priori agreement that (25a) is ungrammatical. Since only two informants belong to the group whose own beliefs affect the complement of pretend (the third parameter of variation which will be discussed shortly), the rest of the informants had merely to construct a context where Carol in (26) is ignorant of the "fact" in order to judge the sentence OK. This happened about 50% of the time. The question of whether one can pretend something he already knows to be true is not under question. Everyone seems to agree that one cannot pretend something he knows is true. But if Carol has never seen grass, she can very well imagine it and pretend that it is green. The actual judgments are:

Affirmative S	Negative S	No. of Informants
OK	OK	13
*	OK	12
*	*	4
OK	*	3
?	OK	1

Table 4

The four speakers who find both the affirmative and negative sentences ungrammatical are those for whom Neubauer would argue a presupposition relationship holds. But I cannot imagine what kind of logical relationship could hold for the three speakers who accept the affirmative sentences but reject the negative ones. It is my opinion that again the ability to find a context for the sentences and the context



selected are the main factors influencing the data. Neubauer says that the people for whom a presupposition relationship holds will reject the negative sentences "read with normal intonation." I am not sure which possible intonation is the "normal" one or what meaning such a reading is supposed to convey.<sup>5</sup> But it is easy to see why Neubauer specifies a "normal intonation." It is fairly easy to come up with contexts for the negative sentences read with stress in various places:

- (27) a. Carol is not PRETENDING that the earth is a sphere. She knows it for sure.
- b. Carol is NOT pretending that the earth is a sphere. She's sitting in the corner making oboe reeds.
- c. Carol is not pretending THAT THE EARTH IS A SPHERE. She's pretending that it's MADE OF FETA CHEESE.

The ease with which you can invent contexts like those above may account for the large number of informants accepting the negative sentences. This does not however explain why three informants rejected the negative sentences but accepted the affirmative ones. The data above does not support dividing speakers into two neat groups: entailers and presupposers. The four speakers rejecting both sets of sentences may very well have a presupposition relationship with pretend, but I am not sure how this could ever be proven. If a speaker can imagine no context where it would make sense for someone to assert that Carol is pretending that the earth is a sphere, then it is very possible that the assertion that Carol is NOT pretending that it is a sphere sounds equally anomalous. It is interesting that a sentence can sound anomalous to a speaker even when he finds a context for it. I suggested contexts to some of the speakers rejecting the negative sentences, and they usually felt that the sentences still were "wierd."

### 3. Speaker's Beliefs vs. Pretender's Beliefs

The third and last parameter along which speakers are supposed to differ with regard to pretend concerns who must believe the complement of pretend to be untrue. An example from Karttunen (1970a) demonstrates this:

- (28) Note: The actual words here are my own and the ones I used with the informants.

There is a man, who we will call Martin, who earns his living as a milkman. Martin comes down with amnesia and doesn't remember that he is a milkman. Martin is put into a psychiatric institution. The doctors there get the idea that they will give Martin a milkman's uniform, milk bottles to carry, and a route to follow and tell him to make believe that he's a milkman. Perhaps this will jog his memory and cure him. Martin cooperates with the doctors and goes out to deliver the milk. While Martin is doing this, could you describe what he is doing by saying

Martin is pretending that he's a milkman. ?

Some speakers will answer "no" since they know that Martin actually is a milkman. He therefore cannot pretend to be one. Most speakers answer "yes." For them, it is sufficient that Martin doesn't know that he's a milkman. Sometimes there is confusion as to what is actually going through Martin's head as he delivers the bottles. I sometimes found it necessary to more firmly establish that Martin's directions are to "make believe" he's a milkman and he cooperates with these directions.

In my interviews, I used two other test situations. The first is from Karttunen and the second is my own:

- (29) In a psychiatric institution there's a patient named Max. Max believes that he's Napoleon. He goes around talking about the Battle of Waterloo, about Josephine, and in general behaving as if he were Napoleon. After several weeks in the institution it dawns on him that they're not going to let him out as long as he behaves this way. He doesn't change his beliefs, but he decides to change his behavior. He's going to "cool it." Could you describe what Max is now doing by saying

Max is pretending that he is not Napoleon. ?

- (30) A small Sioux Indian child is taken from his Sioux parents at a very early age and adopted by a middle class family somewhere in America. The child is never told that he was not naturally born to this family. When the child becomes six or seven years old and is playing "Cowboys and Indians" with the other children, could you describe what he's doing by saying

Johnnie is pretending that he's an Indian. ?

Among the informants there were two who answered "no" to situations (28) and (29). From discussion with them, I feel certain in saying that they answered "no" for the "correct reasons" and Neubauer is right about this variation. One of these two informants is a linguist, and he was able to shed light on why he was able to answer "yes" to (30). (30) is a poor example to use since it involves something that can be construed as "sloppy identity." The kind of Indian involved in playing "Cowboys and Indians" is not the same Indian as a real racial Indian. There were two more negative answers among the informants. One informant rejected (28) and accepted (29) and (30) and the other accepted (28) and (30) but rejected (29). I have no explanation for this behavior.

While I feel that my investigation supports Neubauer's claim that speakers differ along this third parameter, I often had the feeling that the situations were testing something very different than the sentences. Some speakers were immediately able to answer the questions about the situations and did not see what the problem was. For others, it was almost like asking if a tree that falls in a deserted forest makes a noise. It seems that the knowledge used to decide on the situations is somehow different than the knowledge that rejects strings like

(31) John gave home house jump the.

I have no reason though for assuming that one type of behavior is less "linguistic" than the other.

There are two conditions on the use of pretend that seem to be well established and uncontroversial. One is that an act of pretending must be a conscious, deliberate act. Note the ill-formedness of

(32) \*John is unintentionally pretending that he's doing his homework.

(33) \*Mary is pretending that she's blind, but she doesn't mean to.

While it is conceivable that someone could say

(34) Look at the funny bird there. It's hopping up and down and pecking  
at a carrot. The bird is pretending it's a rabbit.

this would attribute the power of consciously deciding to behave like a rabbit to the bird. For people who believe that this is beyond the mental capabilities of a bird, the sentence is anthropomorphizing the

bird and it may seem amusing.

The other condition on pretend that is well established is that one cannot pretend something he knows to be true. This does not mean that everything that is pretended is necessarily false. It might only be undetermined or unknown. In the example where Carol has never seen grass (perhaps she has just arrived from Venus) she may very well pretend that grass is green even though this turns out to be true. It is only necessary that Carol not know definitely that grass is green. There is a common use of pretend which is something like suppose, assume or hypothesize. Consider for example

- (35) Morris is pretending that he's able to account for the schwa epenthesis so he can go on with the rest of the problem.

While it is true that Morris is unable to account for the epenthesis at the time the sentence is uttered, in a certain sense it is uncertain whether Morris will be able to account for it. One might even want to say that whether or not he can account for it is not particularly relevant at the moment. The notion of "possible world" and "sloppy identity" is often very relevant to the use of pretend. This was seen in the situation involving the Sioux Indian. A blind man who is able to get around well by himself can very well amuse others by pretending to be a stereotyped blind man fumbling with a cane. It is interesting that pretend sentences which have a perfectly good use may sometimes strike us as amusing. Consider

- (36) In acting class today, John Rockefeller pretended he was a very wealthy man.

One aspect of the behavior of pretend that has not been studied, to the best of my knowledge, is the type of complement structures it can enter into. I believe that all people get pretend with THAT-complements and with EQUI:

- (37) Zelda pretended that she had never heard of Mr. Bloomenkrautz.  
(38) John pretended to be blind.

I am fairly certain that there are some people who get pretend with RAISING as in

(39) John pretends himself to be the best VW mechanic in Munich. and I am uncertain whether people get pretend with RAISING and non-equi subjects:

(40) John pretends his wife to be the best lasagna maker in Flatbush. People do get pretend in pretend ignorance of the law and I am unsure whether this is a frozen idiom. I have found variation on sentences like

(41) John pretends great knowledge of Renaissance architecture. and it would be interesting to know whether this is connected with pretend ignorance of the law. In short, the complements that can be gotten with pretend is a subject for further investigation and might yield interesting information about dialect variation.

#### 4. Conclusions

In conclusion, the purpose of this paper was to report on an attempt to verify Neubauer's claim that speakers systematically differ in their interpretation of pretend according to three parameters:

- (42) a.  $\sim S$  vs.  $\sim T(S)$   
 b. entailment vs. presupposition  
 c. subject must believe complement to be untrue

vs.

speaker of sentence or subject of higher world-creating  
 verb must believe complement to be untrue.

My investigation found support only for parameter (c). In relation to parameter (a), there was universal consistency on sentences with a certain subgroup of factive verbs and on sentences with a negative in the complement. Where variation did exist, it was not according to expectation. The crucial factor that seems to be involved in making judgments of both grammaticality and of presupposition is the ability of an informant to conceive of a context and the specific context that is imagined. Why speakers differ in these matters is an extremely interesting question, and our ability to find out more about it will greatly affect the accuracy of using informant's judgments as a tool in linguistic research. Perhaps the most interesting conclusion of the research is that all factive verbs have presupposition when negated under pretend, a certain subgroup always has presuppositions whether negative or affirmative, and a third group varies among speakers.

This is further motivation for investigating the subgroupings among the verbs that have been labeled "factive." An interesting question is why realize caused the informants so much difficulty. Perhaps realize is not the prime example it is often held to be. If I had to choose between  $\sim S$  and  $\sim T(S)$  for pretend, I would probably choose  $\sim T(S)$ , but the notion "opposite" might be better for treating negative complements. I found it impossible to make a conclusive judgment that some speakers have a presupposition rather than an entailment for pretend, and the data certainly does not support this two-way split. Again the informant's use of context was crucial. One last conclusion of this paper is that the complement of pretend does not have to be false or untrue. It is sometimes sufficient for the truth value to be unknown to the pretender (at least for most speakers).

#### Footnotes

<sup>1</sup>The informant in this case was very unsure about his judgment but tended toward an affirmative presupposition.

<sup>2</sup>The data for realize is as follows:

i) John pretended that he realized he was sick.

No presupposition - 18

Presupposes John is sick - 10

Presupposes John is not sick - 1

Unable to make judgment - 4

ii) John pretended that he didn't realize he was sick.

No presupposition - 1

Presupposes John is sick - 30

Unable to make judgment - 2

<sup>3</sup>This number might very well be 8, as two informants were unable to make any judgment with realize in this context. Perhaps this is equivalent to assigning the sentences\*.

<sup>4</sup>In cases where the responses do not total up to the 33 informants, informants were unable to form judgments about the sentences.

<sup>5</sup>For a very convincing argument that the notion of "normal stress" is not at all viable see Susan Schmerling, "Presupposition and the Notion of Normal Stress", in Papers from the Seventh Regional Meeting of the Chicago Linguistic Society (1971), University of Chicago, Chicago, Illinois.

## Appendix

(The following are the sentences and situations that were orally presented to the informants. The order of presentation never varied.)

There are some sentences that you hear that force you to conclude certain things. For example, if you heard either

Harry knew that John stole the chemicals.

or

Harry didn't know that John stole the chemicals.

either way you would conclude that it's true that John stole the chemicals. (Wait for informant to agree on this.) I am going to read some sentences to you, and I want you to decide whether there's something you conclude to be true or whether the sentence is not definite and might be used in differing situations.

(1) John pretended that he knew that Mary was guilty.

I'm interested in whether Mary is definitely guilty.

(2) John pretended that he saw Sam take the file.

(3) John pretended that he had found out that Sam spilled the syrup.

(4) John pretended that he forgot that Sheila was a relative.

(5) John pretended that he didn't know that Mary was guilty.

(6) John pretended that he didn't see Sam take the file.

(7) John pretended that he hadn't found out that Sam spilled the syrup.

(8) John pretended that he didn't forget that Sheila was a relative.

Now I'm going to read some sentences, and I want you to try to decide whether you think the sentence might be uttered by someone in some situation, or whether the sentence sounds completely hopeless. In other words, I want you to try to determine whether the sentence might have some use in some situation. You might have to be pretty imaginative in inventing contexts for some of them. The first six sentences begin with the words It is not true that blah blah blah. If it makes any difference to you, when you think about them you may substitute it is not the case that or it is not so that.

(9) It is not true that Ed realizes that the earth is flat.

(10) It is not true that Ed regrets that the earth is flat.

(11) It is not true that Ed has found out that the earth is flat.

(12) It is not true that Ed has discovered that the earth is flat.

(13) It is not true that Ed forgot that the earth is flat.

- (14) It is not true that Ed knows that the earth is flat.
- (15) Ed is pretending that he realizes that the earth is flat.
- (16) Ed is pretending that he regrets that the earth is flat.
- (17) Ed is pretending that he has found out that the earth is flat.
- (18) Ed is pretending that he has discovered that the earth is flat.
- (19) Ed is pretending that he forgot that the earth is flat.
- (20) Ed is pretending that he knows that the earth is flat.

We're now switching to the earth is a sphere. I want you to consider these sentences to express facts and to ignore, for instance, that the earth is slightly egg shaped.

- (21) Carol is pretending that the earth is a sphere.
- (22) Carol is not pretending that the earth is a sphere.  
(The negative sentences were read with heaviest stress on not.)
- (23) Carol is pretending that grass is green.
- (24) Carol is not pretending that grass is green.
- (25) Carol is pretending that London is in England.
- (26) Carol is not pretending that London is England.

We're going to go back now to judging whether there's something you suppose is true.

- (27) John pretended that he didn't resent Harry's leaving a tip.
- (28) John pretended that he resented Harry's leaving a tip.
- (29) John pretended that he hadn't discovered that James took the sulfur.
- (30) John pretended that he discovered that James took the sulfur.
- (31) John pretended that he didn't regret that he had behaved inappropriately.
- (32) John pretended that he regretted that he had behaved inappropriately.
- (33) John pretended that he realized he was sick.
- (34) John pretended that he didn't realize he was sick.

(At this point, I often went back and presented some of the earliest sentences. This was done especially where informants had no presupposition for (30) but did have presuppositions for any of (1) - (3).)

I am not going to present three situations to you and I want you to make a decision.

(The three situations appear in the text as (28) - (30) and were presented in that order.)

Comment: If I were going to do this again, I would give a sentence with a definite presupposition (i.e. 4) earlier. I would also substitute Harry's having left a tip in (27) and (28). There were informants who pointed out contexts where (27) could be said after a conversation in which Harry was planning to leave a tip but never did.



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INTUITIONS OF GRAMMATICALITY AND THE "LAW OF CONTRAST": A PILOT STUDY

Barbara Schwarte

I. Introduction

In his discussion of methodology in transformational-generative grammar Labov (1971) points out that the intuitions of the linguist form the proper and predominant subject matter of generative grammar. Indeed, Chomsky (1965) comments on "the necessity for present-day linguists to give priority to introspective evidence and to the linguistic intuition of native speakers". Generative linguists have rigorously followed this doctrine in actual practice, using linguistic intuition as the basic data for verifying their grammar.

Intuition data, Labov (1971) states, is comprised of several components:

- a. judgements of grammaticality and ungrammaticality,
- b. recognition of ambiguity,
- c. recognition of synonymity, paraphrases and relatedness of sentences,
- d. intuitions about immediate constituents,
- e. similiarity among constituents,
- f. intuitions about markedness.

This paper focuses on the first component--judgments of grammaticality.

The reliability of judgments of grammaticality has been challenged, resulting in quantitative scales of acceptability. For example, Lakoff (1973), claiming that well-formedness is relative and not absolute, presents his data in the following manner:

- (1) I know that tomorrow I'll be on that plane.  
?I realize that tomorrow you'll be in Honolulu.  
?\*I found out that tomorrow Sam will be in Honolulu.  
\*I regret that tomorrow there will be a riot.

where

- =completely acceptable  
?=not quite fully acceptable (i.e., questionable)  
?\*=barely acceptable  
\*=completely unacceptable

Systematic studies have been made concerning the reliability of intuitive judgements. The Quirk and Svartvik (1966) study shows that

grammatical acceptability is a statistical phenomenon with no 100% agreement on any sentence. Similiar results were found by Wedge and Ingemann (1970).

Thomas Bever (1970) suggests that linguistic intuitions are perhaps subject to contextual influence (i.e., that the context in which a sentence appears influences one's judgment of its grammaticality). Indeed, Bever states, this "law of contrast" is one of the more basic laws governing the interaction of stimuli. According to this principle, one's absolute judgements of a stimulus can be exaggerated by the difference between the stimulus and its context. As, for example, a pale green spot surrounded by a yellow background appears blue but when surrounded by red appears green, so when given the sentences

- (2) a. Who must telephone her?
- b. Who need telephone her?
- c. Who want telephone her?,

sentence (b) when preceded by sentence (a) appears ungrammatical but appears grammatical when contrasted with sentence (c).

This paper is an investigation to see whether this "law of contrast" is indeed operant in intuitions of grammaticality. The first hypothesis, then, is that the mean number of judgements of grammaticality will be significantly greater in ungrammatical context than in grammatical context, indicating that judgments of grammaticality are influenced by context and that this "law of contrast" is in operation (Hypothesis I).

Besides looking at the role of context, we shall also be looking at differences in intuitions among subjects. N. J. Spencer (1973) found that nonlinguists agreed among themselves on over 80% of the grammaticality judgments made on examples taken from linguistic articles; they agreed with the linguists' judgments in only half the sentences. In designing this study, linguistically naive and non-naive subjects were included in order to determine if the "law of contrast" influences one group more than the other. Thus, the second hypothesis is that there will be significant differences among linguists, semilinguists, and nonlinguists in the influence of context. Linguists will be significantly more influenced by context than semilinguists; semilinguists will be significantly more influenced by context than nonlinguists. In other words, linguists will

have a significantly greater mean of judgments of grammaticality in grammatical and ungrammatical contexts than semilinguists who will have a significantly greater mean than those of nonlinguists (Hypothesis II).

## II. Method

### A. Subjects

Fifty-one subjects took part in this study: 15 linguists, 21 semilinguists, and 15 nonlinguists. Linguists included 11 graduate students and four professors in the Linguistics Department at the University of Illinois. All but one of the students had completed Linguistics 401 (Syntax I) and most had completed Linguistics 441 (Syntax II). Thus, the linguists were highly linguistically sophisticated. The semilinguists were graduate students currently enrolled in one class of Linguistics 300 (Introduction to General Linguistics). The nonlinguists were mostly graduate students in other fields; three of the nonlinguists were elementary school teachers; one was a secretary. None of the nonlinguists had formal linguistic training.

### B. Target Sentences

In order to measure the effects of the "law of contrast" and linguistic competence on judgments of grammaticality, six "questionable" sentences were selected from several linguistic articles. These were sentences which appeared in the tests with question marks in front of them, indicating that their grammaticality was questionable. Below are listed the six target sentences and their sources:

(3)	<u>Sentence</u>	<u>Source</u>
1.	Rugs I mentioned that you could buy in New York.	"Fuzzy Grammar and the Performance Competence Game" by George Lakoff ( <u>Papers from the Ninth Regional Meeting-Chicago Linguistic Society</u> , April, 1973)
2.	Tom believed that the paper had been written by himself.	"On Declarative Sentences" by John Ross ( <u>Reading in English Transformational Grammar</u> , ed. Jacobs and Rosenbaum, Waltham, Mass.: Ginn and Co., 1965)
3.	I think that tomorrow he thinks he'll leave.	"Fuzzy Grammar and the Performance Competence Game" by George Lakoff

- |  |  |
|--|--|
| 4. Tomorrow I realize that<br>Bill will be in his office.                  | "Fuzzy Grammar and the Performance/<br>Competence Game" by George Lakoff   |
| 5. John is the kinda fella<br>that I know that accidents<br>happen to him. | "Fuzzy Grammar and the Performance/<br>Competence Game" by George Lakoff   |
| 6. I know that John has left,<br>hasn't he?                                | <u>The Major Syntactic Structures of<br/>English</u> by R. Stockwell, P.<br>Schachter, and B. H. Partee (New<br>York: Holt, Rinehart and Winston,<br>Inc., 1973) |

Thirty-six other sentences (18 grammatical and 18 ungrammatical sentences) were also selected from the above articles and others to serve as context sentences. Context sentences were the sentences among which the target sentences were placed. When the three context sentences among which the target sentence was placed were grammatical, the context for that target sentence was considered to be grammatical. The target sentences were those "questionable" sentences we want to determine are influenced by different contexts.

Some of the context sentences were syntactically related to the target sentences they appeared with; some were variants of the target sentences; some of the sentences were totally unrelated to the target sentences they provided context for. The study was designed as such because it is important to determine if the relationship of the context sentences to the target sentence is a variable in intuition judgments.

#### C. Test Format

Three tests were designed in order to examine the role of context in linguistic intuitions. Test 1 consisted of target sentences (1), (5) and (6) appearing in an ungrammatical context (i.e., among three ungrammatical sentences) and of target sentences (2), (3) and (4) appearing among grammatical sentences. Test 2 also consisted of all six target sentences but here target sentences (1), (5) and (8) were placed among grammatical sentences and target sentences (2), (3) and (4) were among ungrammatical sentences. Thus, all six target sentences appeared in both tests 1 and 2, but in test 1 they appeared in one context and in the other test they were in the opposite context. Sentences were randomly assigned to the conditions.

The grammatical and ungrammatical contexts were further divided according to the relationship of the context sentences to the target sentences. There were three possible relationships: Syntactically related, variants, or syntactically and semantically unrelated.

On each test booklet page there were one target sentence and three context sentences.

Test 3 consisted of the six target sentences placed randomly among nine grammatical and nine ungrammatical sentences. The context sentences for test 3 were randomly selected from tests 1 and 2.

In order to control the possible effects of the position of the sentences within the tests, the target sentences appeared in the same position in test 1 and test 2. That is, target sentence (1) appeared as the third sentence of four in both tests. Moreover, the format was such that subjects were presented the target sentences in the same order. In other words, target sentence (1) came first in both tests. Even the presentation of the relationship of the contextual sentences to the target sentence was controlled. First the contextual sentences were syntactically related to the target sentence: then they were variants of the target sentence, and finally they were unrelated, this arrangement was repeated with target sentences (4) - (6).

#### D. Procedure

As stated above, there were 51 subjects--15 linguists, 21 semilinguists, and 15 nonlinguists. By random selection, five of the linguists completed test 1, another five linguists completed test 2; the remaining five completed test 3. Likewise, 7 semilinguists completed test 1, a different set of 7 semilinguists completed test 2 and the remaining 7 were administered test 3. The nonlinguists were also randomly selected to take either test 1, 2 or 3. In this manner, each test was administered to a total of 17 subjects (5 linguists, 7 semilinguists, and 5 nonlinguists).

When presented with the tests, subjects were asked to make judgments of grammaticality on both the target and contextual sentences. They were to circle G if they thought the sentence to be grammatical and UG if it was ungrammatical. Linguists and semilinguists were instructed to mark the sentences as they thought they would be designated in linguistic

articles. The nonlinguists were told to mark the sentences according to whether they thought they were acceptable English sentences or not.

### III. Results

#### A. Role of Context

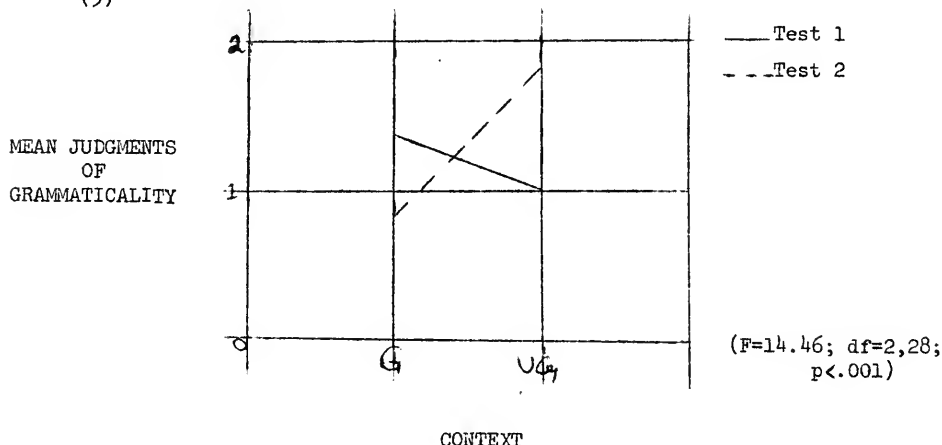
The number of grammatical judgments for the two contexts (grammatical and ungrammatical) for all the subjects in tests 1 and 2 was tabulated and a two-factor analysis of variance was performed. From table (5) below we see that Hypothesis I--the mean number of judgments of grammaticality will be significantly greater in the ungrammatical context than the grammatical context--is supported.

(4)	Grammatical Context	Ungrammatical Context
Mean Number of Judgments of Grammaticality	1.08	1.44

The difference between the two contexts (grammatical and ungrammatical) was significant at the .06 level (.05 is considered significant).

The reason that the context difference is only significant at the .06 level might be found when we look at the interaction of context and tests. A two-factor analysis of variance yielded the following results:

(5)



From this we see that test 1 and test 2 produced different means of judgments of grammaticality. The reason for this is that in test 1 there



were two sentences which were so strongly regarded as ungrammatical (i.e., target sentences (1) and (5)) that context had no effect on the judgments.

Because it was observed that the judgments of grammaticality of the context sentences were often in disagreement with the judgments of the authors of the original articles from which they were selected across all subjects, a tabulation was also made of the number of obvious patterns in the responses. Obvious pattern responses consisted of contrastive responses and conformity responses. Contrastive responses were those in which, when the subjects were given three ungrammatical context sentences, they judged them to be ungrammatical and the target sentence to be grammatical, or vice versa. The "law of contrast" predicts this type of response. Conformity responses were those, for example, in which the subjects, when given three ungrammatical context sentences, marked the sentences as such, along with the target sentences. Thus, the target sentence was marked so as to conform with the other context sentences; all the sentences are judged to be the same. In table (6) we have the results of this tabulation--the percentage of contrastive and conformity responses (i.e., for each test how many subjects out of a possible 17 made both types of responses):

(6) Target Sentence	Contrastive Responses		Conformity Responses	
	Test 1	Test 2	Test 1	Test 2
1	24%	12%	65%	18%
2	18%	41%	35%	12%
3	41%	29%	53%	24%
4	29%	24%	18%	47%
5	0%	6%	71%	24%
6	41%	29%	53%	24%

It appears, then, that the number of conformity responses is higher than that of contrastive responses, especially for test 1. (The reader should exclude target sentences (1) and (5) because these sentences were considered ungrammatical regardless of context.) That conformity responses were higher than contrastive responses is evident from table (7):

(7)	Contrastive Responses	Conformity Responses
Test 1	25.5%	49.0%
Test 2	23.5%	24.5%
Mean	24.5%	36.8%

Thus, in test 1, out of 102 possible cases there were 26 contrastive responses; in test 2 there were 24 contrastive responses. The conformity responses numbered 50 for test 1 and 25 for test 2. Again, the high percentage of conformity responses for test 1 is probably due to target sentences (1) and (5) being ungrammatical regardless of context.

It is interesting to note that with several target sentences there were "opposite" contrastive and conformity responses. By this it is meant that when three contextual sentences were given, these were evaluated as opposite from what the original articles designated them to be. For example, in test 2 target sentence (4) appeared among context sentences considered by the author in the original article to be ungrammatical. In four instances, however, these three contextual sentences were judged by the subjects as being grammatical; the target sentence was also judged as grammatical. This phenomenon also occurred with the contrastive responses. For example, in test 2 target sentence (2) was marked by one subject as being grammatical and the context sentences as being ungrammatical; however, the inverse was predicted.

An investigation was also made to determine if there was an interaction between judgments of grammaticality and the relationship between the target and context sentences:

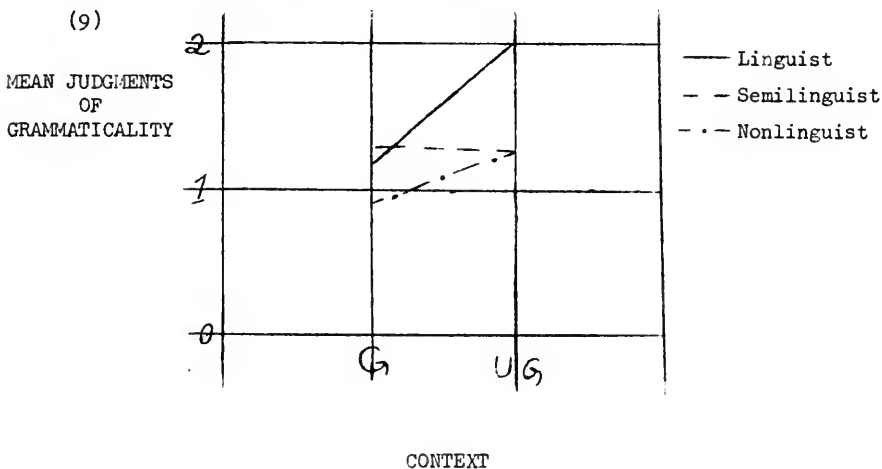
(8)	Target Sentence-Context Relationship	Copy Context	Test 1	Copy Context	Test 2	Copy Context	Test 3
Target Sentence			G UG		G UG		G UG
1	Syntactic	UG	29% 71%	G	24% 76%	R	18% 82%
2	Variant	G	59% 41%	UG	38% 12%	R	65% 35%
3	Unrelated	G	53% 47%	UG	53% 47%	R	53% 47%
4	Syntactic	G	18% 82%	UG	47% 53%	R	59% 41%
5	Variant	UG	18% 82%	G	6% 96%	R	29% 71%
6	Unrelated	UG	47% 53%	G	53% 47%	R	47% 53%

G=grammatical                      n=17  
 UG=ungrammatical  
 R=random

The table above gives the percentage of grammatical and ungrammatical responses for each target sentence. For each test there were 17 subjects; 29% means that 5 out of 17 subjects judged target sentence (1) to be grammatical. The relationship of the context sentences to the target sentences is shown at the right of the sentence number; also given is the context of the target sentence. From (8) we see that when the sentences were syntactically and semantically unrelated (i.e., target sentences (3) and (6)), judgments of grammaticality seemed to be random.

#### B. Naive and Non-naive Linguistic Intuitions

Let us now look at the interaction between context and the linguistic sophistication of the subjects. In (9) we find the mean of grammatical judgments for each context according to the different types of subjects (linguists-L; semilinguists-SL; nonlinguists-NL):



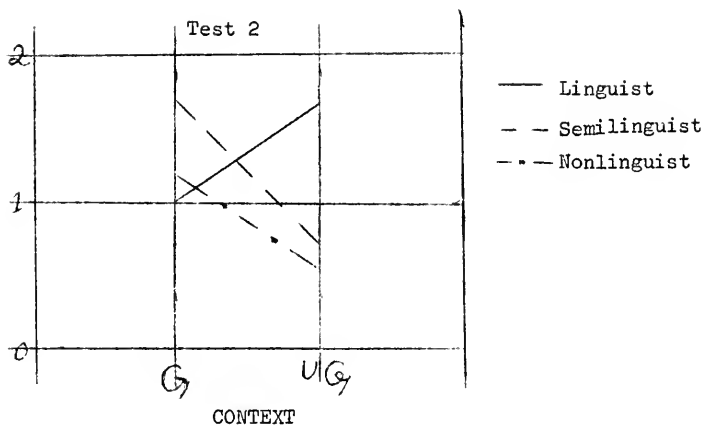
$$(F=2.30; df=2,28; p<.150)$$

It appears that linguists were more influenced by context than were the semilinguists and nonlinguists; the semilinguists were influenced a little more than nonlinguists by context.

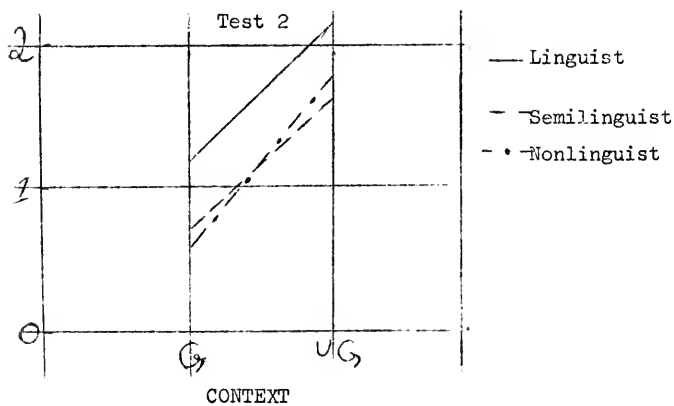
Because above we found that test 1 and test 2 were different, let us look at the interaction of context, subjects and tests:

(10)

MEAN JUDGMENTS  
OF  
GRAMMATICALITY



MEAN JUDGMENTS  
OF  
GRAMMATICALITY



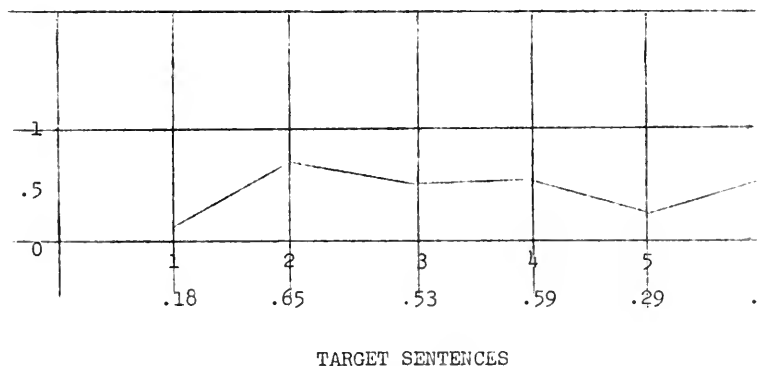
( $F=2.24$ ;  $df=2,28$ ;  $p<.125$ )

Hypotheses I and II are confirmed in the case of test 2. Here, there were more judgments of grammaticality in ungrammatical contexts than in grammatical contexts. We also see that linguists tended to make more judgments of grammaticality than semilinguists and nonlinguists. This distinction between linguists and the semilinguists and nonlinguists is confirmed by the results of test 3 (see below). In test 1, however, the results were not as predicted. Linguists' judgments were as predicted, but for the semilinguists and nonlinguists, there were fewer judgments of grammaticality in the ungrammatical context than in the grammatical context. The reason for this can be found in the analysis of the sentences in test 3.

In test 3, it was expected that all the sentences would be judged grammatical approximately half of the time since they were "questionable" with regard to grammaticality. For target sentences (2), (3), (4) and (6) this was the case; for target sentences (1) and (5), however, this was not the case:

(11)

MEAN JUDGMENTS  
OF  
GRAMMATICALITY



( $F=2.30$ ;  $df=5,70$ ;  $p<.05$ )

Figure (11) indicates that target sentences (1) and (5) were not "questionable" sentences as indicated by linguistic articles but instead were ungrammatical as judged by linguists, semilinguists, and non-linguists. The probable reason for this will be discussed below. This explains why we have the inverse of what we predicted in Figure (10). Both target sentences (1) and (5) were in an ungrammatical context in test 1. It was predicted that they would be judged as grammatical in such a context but since they were more ungrammatical than "questionable", context played no role. An interesting result is that for linguists, context was influential; for the semilinguists and nonlinguists it was not. Evidently, for the linguists this sentence was not as ungrammatical as it was for the semilinguists and nonlinguists.

Let us now look at how subjects differed in their judgments of individual target sentences:

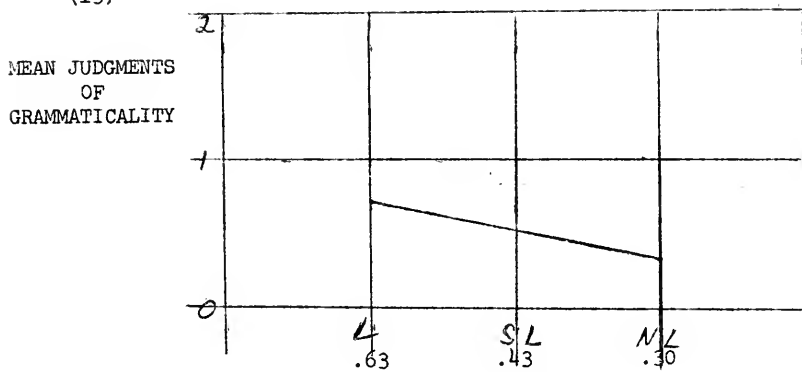
(12)

Target Sentence	Subject	Context	Test 1		Context	Test 2		Context	Test 3	
			G	UG		G	UG		G	UG
1	L		80%	20%		40%	60%		40%	60%
	SL	UG	14%	86%	G	14%	86%	R	14%	86%
	NL		0%	100%		20%	80%		0%	100%
2	L		40%	60%		100%	0%		100%	0%
	SL	G	57%	43%	UG	86%	14%	R	57%	43%
	NL		80%	20%		80%	20%		40%	60%
3	L		60%	40%		80%	20%		100%	0%
	SL	G	21%	79%	UG	43%	57%	R	43%	57%
	NL		20%	80%		40%	60%		20%	80%
4	L		0%	100%		40%	60%		60%	40%
	SL	G	43%	57%	UG	43%	57%	R	71%	29%
	NL		0%	100%		60%	40%		40%	60%
5	L		40%	60%		20%	80%		20%	80%
	SL	UG	0%	100%	G	0%	100%	R	29%	71%
	NL		20%	80%		0%	100%		40%	60%
6	L		60%	40%		60%	40%		60%	40%
	SL	UG	57%	43%	G	57%	43%	R	43%	57%
	NL		20%	80%		40%	60%		40%	60%

In table (12) we have the percentage of grammatical and ungrammatical judgments for each target sentence in each test for each group of subjects; for example, four out of five linguists (i.e., 80% of the linguists) judged target sentence (1) in test 1 to be grammatical; one linguist (i.e., 20%) judged it as ungrammatical. From (12) we see that for the different target sentences, the groups did differ. Linguists and semilinguists/nonlinguists differed especially with regard to target sentence (1) in test 1--"Rugs I mentioned that you could buy in New York". As stated above, this sentence in test 3 was judged as ungrammatical by a large majority. The reason is probably because semilinguists and nonlinguists do not permit topicalization in their dialects; linguists probably do not use topicalization either but recognize it as a possible transformation. There was also a difference between linguists and semilinguists/nonlinguists in judgments of target sentence (3)--"I think that tomorrow he thinks he'll leave", especially in test 3 where it was not in context. When in context, the difference was not as great. Even here, we see the tendency for linguists to accept more sentences as grammatical than semilinguists and nonlinguists, regardless of context.

Indeed, when differences in the groups were investigated, it was found that linguists did in fact make more judgments of grammaticality than semilinguists and nonlinguists. In other words, linguists accepted more sentences as grammatical than the other two groups. In test 3, linguists had a higher percentage of judgments of grammaticality than did the semilinguists; the semilinguists had slightly more than the nonlinguists:

(13)

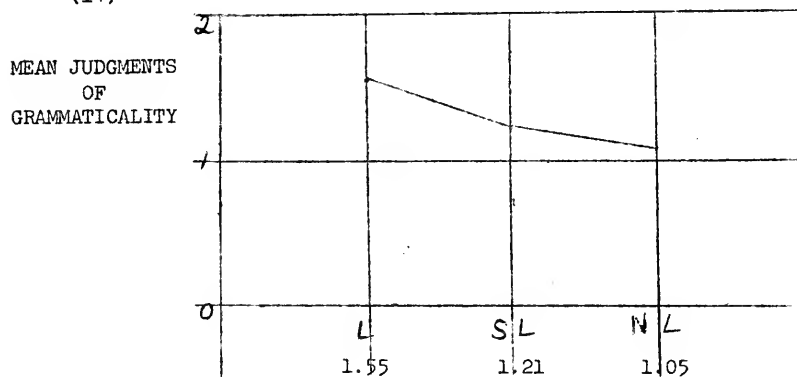


SUBJECTS

(F=6.32;df=2,14;p&lt;.011)

This result is confirmed by our data from test 1 and test 2:

(14)



SUBJECTS

(F=1.32;df=2,28;p&lt;.282)



The contrastive and conformity responses were also broken down by groups to determine any significant differences between linguists, semi-linguists, and nonlinguists. Table (15) presents the percentage of contrastive and conformity responses for each set of subjects; for example, in test 1 three out of the five linguists made contrastive responses to target sentence (1).

(15)		Contrastive Responses		Conformity Responses	
Target Sentence		Test 1	Test 2	Test 1	Test 2
1	L	60%	40%	0%	40%
	SL	14%	0%	86%	14%
	NL	0%	0%	100%	0%
2	L	20%	60%	40%	0%
	SL	29%	43%	29%	14%
	NL	0%	20%	40%	20%
3	L	40%	40%	60%	0%
	SL	29%	29%	71%	29%
	NL	20%	20%	20%	40%
4	L	100%	0%	0%	40%
	SL	0%	14%	43%	57%
	NL	0%	60%	0%	40%
5	L	0%	0%	60%	0%
	SL	0%	0%	71%	57%
	NL	0%	20%	80%	0%
6	L	40%	40%	40%	20%
	SL	57%	29%	43%	43%
	NL	20%	20%	80%	0%

The data in table (15) indicate that linguists display a larger percentage of contrastive responses per test than the other two groups. More than half of the linguists had contrastive responses in three out of twelve possible target sentences. Only with target sentence (4) did more than half of the nonlinguists have contrastive responses. With the conformity responses, the majority of the nonlinguists had conformity responses; semilinguists showed five instances of more than half of the group making conformity responses.

#### IV. Discussion

Several tentative conclusions can be drawn from this pilot study on intuition judgments and context. Hypothesis I, that context would influence judgments of grammaticality, is confirmed by the data. There was a higher number of grammatical judgments in the ungrammatical context than in the grammatical context, and, conversely, sentences in an ungrammatical context were judged as grammatical with greater frequency than when in a grammatical context. Moreover, the relationship of the contextual sentences to the target sentences also seemed to be factor. When context sentences were syntactically and semantically unrelated to the target sentence, there did not seem to be much influence. In addition, the "law of contrast" is not the only law operating; a "law of conformity" can be observed. This "law of conformity" was at least as strong an influence as the "law of contrast" in intuitions of grammaticality. Thus, it becomes apparent that in addition to the "law of contrast", there are other variables which influence intuition judgments.

More conclusive results from the study dealt with the differences in intuition judgments among linguists, semilinguists, and nonlinguists. It was predicted that linguists would accept more sentences as grammatical than semilinguists and that semilinguists would accept more sentences as grammatical than nonlinguists. The results from all three tests confirmed this hypothesis. This supports the findings of Spencer (1973). It would be interesting to examine these results in greater depth in order to determine the relevant variables and influences which distinguish the intuitions of these groups.

Finally, the results indicated that even the "absolute" sentences are relative. By "absolute" it is meant that their grammaticality is taken to be fixed; that is, these sentences are grammatical without question. That sentences are not "absolute" is evident from the fact that context sentences were often judged by subjects as opposite of their supposed grammaticality by the authors in the original articles. This supports Quirk and Svartvik's findings that intuition judgments are a statistical phenomenon. Indeed, this brings us to one of the

problems of the study--some of the context sentences were "questionable" for the subjects. For example, with target sentence (1) in test 2 many subjects marked the supposedly grammatical contextual sentences as ungrammatical. Moreover, often subjects would consider two of the context sentences to be grammatical and the other context sentence to be ungrammatical, thus destroyed the hypothesized context. As commented above, this is probably due to dialect differences. Thus, for target sentence (1) not all dialects of American English allow topicalization, accounting for why subjects marked the grammatical context as ungrammatical. Unfortunately, these dialect differences were not anticipated when the tests were designed. In the future, structures which vary greatly from dialect to dialect should be avoided.

Just as there were cases in which not all the context sentences were absolute, so there were also cases in which not all the target sentences were "questionable". This was especially true for target sentences (1) and (5). Again, for target sentence (1) this was probably because not all dialects of English allow topicalization. Target sentence (5)--"John is the kinda fella that I know accidents happen to him"--perhaps should have been written with kind of fellow instead of kinda fella. Kinda fella might have caused some to mark it and its variations ungrammatical because of its transcription form.

As stated above, the position of the target sentences among the context sentences was controlled. However, it might be that position played a greater influence than anticipated. If a target sentence appeared first, then it was probably not contrasted with the other sentences; however, if it appeared last, it would have been contrasted with the other sentences. In this study, position was controlled only in that the target sentences appeared in the same position in tests 1 and 2.

Whereas in test 1 and test 2 it was desirable that the target sentences be contrasted with their context sentences, in test 3 we did not want this contrastive process to occur. Although the sentences in test 3 were presented in random order, there was no assurance that subjects did not contrast sentences since the format of the test was

such that 13 sentences appeared on the first page of the test and 11 on the second. The context sentences for test 3 were taken from tests 1 and 2, thus including sentences which were related to the target sentences in the test. Perhaps test 3 should have been constructed so that there was only one sentence per page; the context sentences should have been taken from other sources.

Another variable which may have influenced the results were the instructions given to the subjects. To the linguists and semilinguists, it was clear what was meant by "grammatical", especially when told to judge the sentences as they would appear in linguistic articles. To nonlinguists, however, the concept of grammaticality was more difficult to explain. They were instructed to judge the sentences according to whether they were acceptable English or not. Whether or not "grammatical" has the same meaning as "acceptable English" is highly questionable.

Although 51 subjects were administered the tests, a larger sample should have been utilized. The problem with the small sample was especially noticeable when comparing naive and non-naive linguistic intuitions--for each cell there were only five linguists, seven semilinguists, and five nonlinguists.

Finally, the "language-as-fixed-effect" fallacy was not taken into consideration (Clark, 1973). The language-as-fixed-effect suggests that the results cannot be generalized beyond the particular sample of words or sentences used in the study. Stimulus sentences usually deal with such specific linguistic constraints and are often so difficult to construct, that the usual design includes only a few sentences. Sentences are usually treated as a fixed, instead of a random, factor. It would be necessary to take this into consideration in future studies.

The results of this study confirm Spencer's results and conclusions. Spencer (1973) suggests that linguists should not use their own intuitions but those of nonlinguists. The reason is that linguists accept more sentences as being grammatical than do semilinguists and nonlinguists. The data presented here support this claim. Spencer proposes several possible explanations for this. One reason might be that linguists in their studies have developed an increased awareness and sophistication

in language. A second explanation is that linguists are simply more sensitive to language and therefore "are able to detect finer differentiations than naive speakers in intuitions concerning natural language, rather than creating differentiations which do not exist within the natural language". The question, however, is open to discussion.

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Test questions were originally given four to a page. In order to conserve space, we have condensed them.  
(Editor)

## APPENDIX

## Sample - Test 1

Please judge the following sentences as being either grammatical (G) or ungrammatical (UG).

E.g. John and Harry drank a glass of beer together.	G	UG
Sam I bought Picasso's picture of.	G	UG
Sue I wonder who hit.	G	UG
Rugs I mentioned that you could buy in New York.	G	UG
Harry I believe Mary's plane John hit.	G	UG
I told Tom that the paper should be written by Ann and himself.	G	UG
Tom believed that the paper had been written by Ann and himself.	G	UG
Tom believed that the paper had been written by himself.	G	UG
That the paper would have to be written by Ann and himself was obvious to Tom.	G	UG
It's likely that tomorrow he will leave.	G	UG
They think that he will not get here until noon.	G	UG
I saw him dig a hole in the ground.	G	UG
I think that tomorrow he thinks he'll leave.	G	UG
Tomorrow I think John will leave.	G	UG
Tomorrow I realize that Bill will be in his office.	G	UG
Tomorrow I know Bill will be in his office.	G	UG
Tomorrow Bill says he'll be able to do your tax return.	G	UG

John is the kinda fella that I know that accidents happen to him.	G	UG
John is the kinda fella that you find out that accidents happen to him.	G	UG
John is the kinda fella that I realize that accidents happen to him.	G	UG
John is the kinda fella that you discover accidents happen to him.	G	UG
Myself wrote this paper.	G	UG
Heed began to be paid to urban problems and attention did so too.	G	UG
The landlord is upset about the window which I saw the boy who broke it.	G	UG
I know that John has left, hasn't he?	G	UG

Name \_\_\_\_\_

Please answer the following questions:

- Have you even been enrolled in a linguistics course? Yes No
  - If yes, have you completed
 

linguistics 300	Yes	No
linguistics 401	Yes	No
linguistics 441	Yes	No
linguistics 481	Yes	No
  - If you have been enrolled in any syntax course other than those listed above, please list \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- Are you currently enrolled or have you ever been connected with the U of I Department of Linguistics?
  - If yes, what was/is your capacity? Student Professor
  - If no, please state your occupation \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- Are you a native speaker of English? \_\_\_\_\_  
 \_\_\_\_\_



## Sample - Test 2

Please judge the following sentences as being either grammatical (G) or ungrammatical (UG).

E.g. John and Harry drank a glass of beer together.	G	UG
Beans I think John will eat.	G	UG
Tax returns John says he can do for you.	G	UG
Rugs I mentioned that you could buy in New York.	G	UG
Desks I know we can get from the company.	G	UG
The girl who Tom spurned believed that the paper had been written by Ann and himself.	G	UG
Tom believed that himself had written the paper.	G	UG
Tom believed that the paper had been written by himself.	G	UG
That the paper would have to be written by Ann and Tom was obvious to himself.	G	UG
Tomorrow I'm surprised that Bill will be in his office.	G	UG
Tomorrow I realize that Bill will be in his office.	G	UG
Tomorrow I discovered that he'll be able to do your tax returns.	G	UG
Tomorrow I found out that tax returns are due.	G	UG
John is the kinda fella that I know that accidents happen to him.	G	UG
John is the kinda fella that you can easily believe the claim that he was once a millionaire.	G	UG
John is the kinda fella that accidents naturally happen to him.	G	UG
John is the kinda fella that the fact that accidents happen to him bothers you.	G	UG
The accident which I understand the committee investigated was the worst in the state's history.	G	UG
Heed began to be paid to urban problems.	G	UG
Any shooting by the hunters must be stopped.	G	UG
I know that John has left, hasn't he?	G	UG

Name \_\_\_\_\_

Please answer the following questions:

1. Have you even been enrolled in a linguistics course? Yes No
  - a. If yes, have you completed
 

linguistics 300	Yes	No
linguistics 401	Yes	No
linguistics 441	Yes	No
linguistics 481	Yes	No
  - b. If you have been enrolled in any syntax course other than those listed above, please list \_\_\_\_\_  
\_\_\_\_\_
2. Are you currently enrolled or have you ever been connected with the U of I Department of Linguistics?
  - a. If yes, what was/is your capacity?      Student      Professor
  - b. If no, please state your occupation \_\_\_\_\_  
\_\_\_\_\_
3. Are you a native speaker of English? \_\_\_\_\_

Sample - Test 3

Please judge the following sentences as being either grammatical (G) or ungrammatical (UG).

- |  |   |    |
|--|---|----|
| E.g. John and Harry drank a glass of beer together.                            | G | UG |
| Tomorrow I think John will leave.  | G | UG |
| Tom believed that himself had written the paper.                               | G | UG |
| Tomorrow Bill says he'll be able to do your tax return.                        | G | UG |
| Any shooting by the hunters must be stopped.                                   | G | UG |
| Rugs I mentioned that you could buy in New York.                               | G | UG |
| John is the kinda fella that you find out that accidents happen to him.        | G | UG |
| The landlord is upset about the window which I saw the boy who broke it.       | G | UG |
| They think that he will not get here until noon.                               | G | UG |
| Sue I wonder who hit.  | G | UG |
| That the paper would have to be written by Ann and himself was obvious to Tom. | G | UG |

John is the kinda fella that I realize that accidents happen to him.	G	UG
I think that tomorrow he thinks he'll leave.	G	UG
Sam I bought Picasso's picture of.	G	UG
John is the kinda fella that the fact that accidents happen to him bothers you.	G	UG
Tomorrow I realize that Bill will be in his office.	G	UG
I saw him dig a hole in the ground.	G	UG
Tomorrow I'm surprised that Bill will be in his office.	G	UG
John is the kinda fella that I know that accidents happen to him.	G	UG
Carefully it's likely that Sam will slice the salami.	G	UG
Desks I know we can get from the company.	G	UG
I told Tom that the paper should be written by Ann and himself.	G	UG
I know that John has left, hasn't he?	G	UG
Myself wrote this paper.	G	UG
Tom believed that the paper had been written by himself.	G	UG
Name _____		

Please answer the following questions:

1. Have you even been enrolled in a linguistics course? Yes No
  - a. If yes, have you completed
 

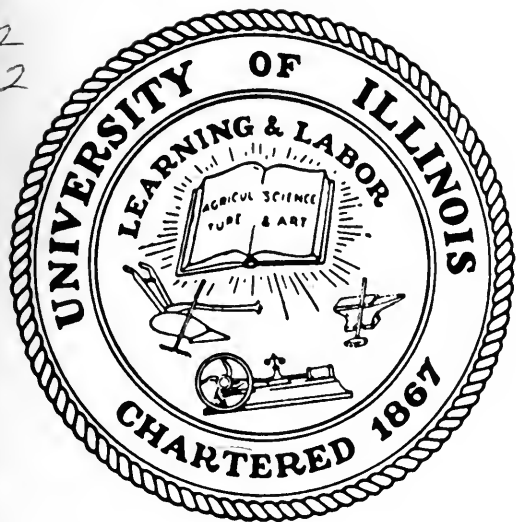
linguistics 300	Yes	No
linguistics 401	Yes	No
linguistics 441	Yes	No
linguistics 481	Yes	No
  - b. If you have been enrolled in any syntax course other than those listed above, please list \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
2. Are you currently enrolled or have you ever been connected with the U of I Department of Linguistics?
  - a. If yes, what was/is your capacity?
 

Student	Professor
---------	-----------
  - b. If no, please state your occupation \_\_\_\_\_  
 \_\_\_\_\_
3. Are you a native speaker of English? \_\_\_\_\_









# **STUDIES IN THE LINGUISTIC SCIENCES**

**VOLUME 4, NUMBER 2 FALL, 1974**

DEPARTMENT OF LINGUISTICS, UNIVERSITY OF ILLINOIS  
URBANA, ILLINOIS 61801

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# TABLE OF CONTENTS

John G. Barnitz: Bloom-p-field, Chom-p-sky, and Phonetic Epen-t-thesis.....	1
Marilyn Bereiter: A Study of Duration in Speech Production.....	14
Tej K. Bhatia: A Study of Aspirated Consonants as Spoken and Recognized by Hindi Speakers.....	25
Rodolfo Cerrón-Palomino: Morphologically Conditioned Changes in Wanka-Quechua.....	40
Gerry Dalgish: Arguments for a Unified Treatment of Y-Initial and Vowel-Initial Roots in Olutsootso.....	76
Karen Dudas: A Case of Functional Phonological Opacity: Javanese Elative Formations.....	91
Chin-W. Kim: A Note on Tonal Conjunction in Efik.....	112
Charles W. Kisseberth and Mohammad Imam Abasheikh: The Perfect Stem in Chi-Mwi:ni.....	123
Charles W. Kisseberth and Mohammad Imam Abasheikh: On the Interaction of Phonology and Morphology: a Chi-Mwi:ni Example.....	139
Margie O'Bryan: Opacity and Rule Loss.....	148
Farid M. Onn: Speech Chain as an Analysis-by-Synthesis Model: A Review.....	161
Han Sohn and C-W. Kim: Phonetic Research at the University of Illinois.....	172



BLOOM-P-FIELD, CHOM-P-SKY, AND PHONETIC EPEN-T-THESIS

John G. Barnitz

- 0.0. Introduction
- 1.0. Epenthesis Defined
- 2.0. Diachronic and Synchronic Epenthesis
  - 2.1 Epenthesis Over Centuries
  - 2.2 Traditional vs Generative Historical Linguistics
  - 2.3 Articulatory Bases for Epenthesis
  - 2.4 An Experiment in Synchronic Epenthesis
- 3.0. Conclusion
- 0.0.

A frying pan company's advertising campaign included glaring store displays with the lettering: "HOT PANS." Everyone has heard stories of an ugly duckling or a handsome prince; but, Kodak in one television commercial told the story of "the ugly film cartridge and the handsome prints." These puns from Madison Avenue are significant to the study of speech sounds in transition, particularly the phenomenon of phonetic epenthesis. Why does /pənts/ sound like /pənz/? Why does /prəns/ become [prənts]? Where is epenthesis most likely to take place? This study will explore phenomena of synchronic and diachronic epenthesis in order to discover some phonetic facts behind it.

1.0.

Before we proceed with the main discussion, it is necessary to define epenthesis both in the traditional sense and in the generative phonological sense. Excrecent sounds are any additional segments resulting from a rephasing of articulation. Traditional epenthesis refers to the process of adding to a word a non-phonemic consonant (in most cases a stop). This is a synchronic phenomenon which often gives rise to a diachronic epenthesis, where the phonetic excrecent consonant becomes phonemic. Thus, the pronunciations of Chomsky/Chompsky illustrates synchronic epenthesis, while the change O. E. [θymle] > Mod. E. thimble illustrates diachronic epenthesis.<sup>1</sup>

The other type of excrecence is anaptyxis defined by Bloomfield (1933:

384) as "the rise of a vowel beside a sonant, which becomes non syllabic." Anaptyxis occurs diachronically in the change: P.I.E. \*[agros] 'field' > pre-Latin \*[agr] > Latin [ager]. Another example is Latin schola (scola) 'school' becoming French école, Portuguese escola, and Spanish escuela. Anaptyxis occurs synchronically in film [fɪləm], elm [ɛləm], Henry [hənəri], and athlete [æθlɪt]. The scope of this paper will not include an explanation for anaptyxis.

While epenthesis in traditional linguistics applies only to consonants, the term in generative linguistics refers to both consonants and vowels. Phonological epenthesis is claimed to be an abrupt insertion of a segment. Thus a rule of epenthesis will account for (but not explain why there is) the phonological alternation in the following data from Yawelmani (Kenstowicz et al., Chap. 4).

paʔt̚ - al	'might fight'	paʔit̚ - hin	'fights'
ʔilk - al	'might sing'	ʔilik - hin	'sings'
logw - al	'might pulverize'	logiw - hin	'pulvarizes'

Assuming CVCC- as the base form, the epenthesis rule will insert an [i] to break up the consonant cluster:

$$\emptyset \rightarrow i / C \_ CC$$

This paper will not deal with epenthesis within the framework of generative phonology. I am concerned here with the phonetic facts which "underlie" any phonological rules. (See Guile 1971 and 1972 for details of phonological epenthesis). I am also limiting this study to epenthetic stops, the most common excrescent consonants. (For a discussion of epenthetic glides, see Heffner 1950.)

## 2.0.

We can discuss the process of phonetic epenthesis in a twofold manner. First, we will examine historical sound changes most of which introduced homorganic stops. Secondly, we will examine synchronic epenthetic processes. A comparison of diachronic and synchronic epenthesis will provide support to the hypothesis that epenthetic homorganic stops will (in most cases)

break up nasal-liquid and nasal-fricative consonant clusters, phonetically unstable clusters in language.

## 2.1.

Examples of historical developments of nasal-liquid clusters are plentiful. An epenthetic homorganic stop arose between a nasal and [l] in many cases. Old English br̥emel and br̥æmbel were in free variation. The latter form was acquired by later generations yielding Modern English bramble. The same occurred with O. E. [θymle] which became Modern English thimble. Latin humilem became English humble, creating the alternation humble ~ humility. Several other "ble" words in English received the epenthetic stop before being borrowed into English. Indo-European \*tem-lo-m became Latin templum which became English temple. Likewise Indo-European \*eks-em-lo-m changed to Latin exemplum which became English example. In these cases the excrescent stop was bilabial because of the point of articulation of the preceding nasal [m]. However, an alveolar stop will intervene between an alveolar nasal and [l] in O. E. spinel > spindle. I would also suspect that an excrescent velar stop will intervene between a velar nasal and a liquid, although I have no examples (hypothetically/ bloŋkli > [bloŋkli]): but, this would not occur in early English, since Old English had no velar nasal phoneme.

Likewise, the articulation of nasal + [r] has often resulted in the appearance of an epenthetic stop. The sequence [mr] became [mbr] in English timber which is traceable to a free variation in Gothic between [timrjan]/[timbrjan]. The latter became Old English timbrian which is cognate with German zimmer. (Why no excrescent [b] became phonemic in German, I am not sure; although, I would suspect that German speakers will occasionally epenthesise on a synchronic phonetic level and will of course not be consciously aware of it.) Another case of the sound change [mr] > [mbr] is P.I.E. \*a-mrot-os > Greek ambrotos 'immortal'. English borrowed the word encumber from French already with the epenthesis.

There are many cases of the sound change [nr] > [ndr]. Old English had

the forms ganra and gandra in free variation, the latter becoming Modern English gander. Likewise, Modern English thunder came from O. E. [θunrian] which had as a variant [θundrian]. Similarly, Indo-European \*anr-os became Græek andros 'man', and Latin allegro ten(e)re became French tendre. I have no examples of a sound change [ŋr] > [ŋgr], although it is theoretically possible in Modern English. There were no phonemic examples of /ŋ{<sub>r</sub>} / > /ŋg{<sub>r</sub>} / because Old English had no velar nasal phoneme.

Aside from nasal-liquid clusters, there are many cases of diachronic epenthesis between nasal-fricative clusters. Examples of the change [ms] > [mps] include the proper names Thompson and Sampson. The sequence [mʃ] became [mpʃ] in the case of Hampshire. The sequence [ns] became [nts] in English varmint (perhaps < vermin / \_\_\_\_ s ); but the sequence [nz] became [ndz] in the derivation: O. F. son > M. E. soun > sound / \_\_\_\_ z. Perhaps the excremental stops in sound and varmint originally appeared in the plural forms; the stop then being transferred to the singular form by analogy in the paradigm back formation. In all of these examples, the stop is homorganic with the preceding nasal and also receives the feature of voicing from the following fricative. I would expect to find examples of epenthesis between [nθ], [nð], [nz], [mθ], [mz], but I do not have any examples of these as a diachronic phenomenon. However, the change [nz] > [ndz] would probably not be found in English since Old English did not have a /z/ phoneme.

Although nasal-liquid and nasal-fricative clusters are the most susceptible to epenthesis, there are other environments where epenthesis has occurred. The cluster nasal - stop in empty and exempt were broken up in these two examples:

I. E. ex - emere > Latin exemptus > English exempt

O. E. emptig > Mod. English empty.

The cluster liquid-liquid was broken up here:

O. E. [alre] > Mod. Eng. alder

A major sound change of epenthesis in Indo-European is [sr] > [str].



Where Indo European has \*[sr], Germanic and Slavic have [str]. Thus proto Indo European \*srow- (stream) changed to: primitive Germanic [strawmaz], Old Norse [strawmr], Old English [stre:am], and Old Bulgarian [struja] (Bloomfield 1933: 384). This epenthesis is particularly interesting because it suggests to us the fact that when consonant clusters (when borrowed) are not admissible to sequential rules of morpheme structure, the cluster will be broken up to fit the sound pattern of the particular language. For example, hypothetical [srɪk] could undergo a change when borrowed into English to become [strɪk].

We may so far conclude that epenthesis of homorganic stops follow similar patterns across languages. Epenthesis will break up unstable consonant clusters of any language. Thus, these clusters are the most susceptible to sound change.

## 2.2.

The crucial question to raise is WHY? How can we explain these sound changes? Are they brought about by a change in the grammar, i.e. a change in the native speaker's competence resulting from the addition of a phonological rule? Or is epenthesis the result of his performance, i.e. a rephrasing of articulation? These questions can be sufficiently answered in a very theoretical way by mentioning the differences between traditional and generative approaches to sound change.

The traditional view (Bloomfield, Hockett) claims that change is a gradual process and is therefore imperceptible to the speakers of the same generation. Not only is sound change gradual, but it is ever progressing; no two performances of the same utterance are the same. In other words, sound change is a change in performance, not competence. (However, the performance of one generation might become the competence of the next generation as variant forms are acquired by children, who construct their own grammar on one of the alternants in free variation.)

Directly opposing this view of sound change is the generative approach (King 1969, Postal 1968). It is maintained that language change is not a

change in performance, but a change in competence. The role of performance then is insignificant to the change; it did not cause the change in grammar. Generativists also claim that language change is not gradual, but is abrupt. In other words, a sound is said to be inserted, deleted, transposed, or shifted in an abrupt fashion through the application, loss, or reordering of phonological rules. King (1969: 109) argues: "There is the indisputable existence of cases such as loss, metathesis, and epenthesis in which any kind of gradual process strains the imaginative faculties as well as the set of distinctive features that one assumes to be universal." Unfortunately, King's theory will fail to give a complete account of phonetic "facts" behind epenthesis. (Later in this paper I will suggest the notion of "degrees of epenthesis," suggesting the possibility that diachronic epenthesis is not an abrupt process or an "insertion.") The historical generativists would consider epenthesis as an "insertion," which would fail to explain why Slavic slověne and Greek Σχλαβῖνοι are related to each other. But Maher (1970: 32) explains:

In pronouncing slověne, Slavs felt they were saying and hearing an s followed by an l; no other segments of features were noted on the Slavic side. But on the Greek side, a different impression was had of the same phonetic material. In the Slavic (and modern English) cluster the l is voiceless in its onset; this l is made with an audible click made by the sides of the tongue breaking away from the molars when the tongue jumps from s-position to l-position. Greek had no cluster which its speakers analyzed as sl, but did have several phonetically similar clusters: skl, sθl, stl, which like the Slavic sl present a voiceless allophone of l. The phonetic click which the Slavs made but did not "hear," that is to say was not phonemic or distinctive, but was a redundant feature of post-s environment, was interpreted by the Greeks . . . as their kappa.

Thus, the real story of why epenthesis occurs lies not in generative phonology, but in articulatory phonetics.

### 2.3.

Let us examine the articulatory bases for several historical examples discussed above. We have seen that when two sounds are contiguous, quite

often there will be a transitional segment occurring between them. This is especially true if there is an asynchronism in the articulation of one of them (Heffner, 1950: 185). Consider English timber < O. E. timbrjan < Gothic [timrjan]~[timbrjan]. In the transition between [m] and [r], the articulatory movements must include both the raising of the velum and the simultaneous movement of the tongue from the neutral position during the closure for [m] to the trill position of [r]. The differences between the Gothic variants is the timing of these muscular movements. In the case of [timrjan], the movements are simultaneous; but, in the case of [timbrjan] the movements are out of phase. If the velum is raised before the movement of the tongue, there will be a moment of oral occlusion, phonetically a stop. The stop will be homorganic with the preceding nasal since the point of closure is the same as the nasal during the raising of the velum. Furthermore, the stop will be voiced because the vocal folds do not stop vibrating in the transition between the two voiced consonants. The transition between [m] and [r] is summarized in the following diagrams:

simultaneous movements

	[m]		[r]
velum:	lowered	→	raised
lips:	closed	→	open
tongue:	down	→	up
glottis:	voicing	→	voicing

asynchronous movements

	[m]		[b]		[r]
lowered	→	raised	→		
closed	→				open
down	→				up
voicing	→				voicing

The same description can be given to O. E. spinel > Mod. Eng. spindle:

simultaneous movements

	[n]		[l]
velum:	down	→	up
teeth:	closed	→	open
tongue:	down	→	up
glottis:	voicing	→	voicing

asynchronous movements

	[n]		[d]		[l]
down	→	up	→		
closed	→				open
down	→				up
voicing	→				voicing

Antilla (1972: 69) lists cases from West Lapp of the reverse process where a homorganic stop occurs in front of a nasal. This is caused by the delayed lowering of the velum, the nasal segment starting before the complete lowering of the velum. Thus \*ruma > robme 'ugly', \*sone > suodna 'vein', and \*poŋe > buoŋa 'bosom'.

In the cases of nasal - fricative consonant clusters, epenthesis can be represented in the same type of diagram. Consider [tamson] vs [tampson].

simultaneous movements

	[m]	->	[s]
velum:	down	->	up
lips:	closed	->	open
tongue:	low	->	high
glottis:	voice	->	voiceless

asynchronous movements

	[m]		[p]		[s]
down	->	up			
closed	----->		open	->	
low	----->		high		
voice	->	voiceless	->		

These examples were composed of nasal-liquid and nasal-fricative clusters. But, what happens in the case of nasal-stop clusters as empty? This could have occurred by the premature release of the bilabial occlusion and the raising of the velum before the movement of the tongue for [t].

This discussion has provided a phonetic explanation of epenthesis, the result of nonsynchronous articulatory movements in transition between one sound to the next. Thus, it seems simplistic to describe epenthesis only as an insertion by rule as the generativists claim to be the case.

#### 2.4.

The focus of our attention now turns to the topic of synchronic epenthesis in order to see that the same clusters involved in diachronic epenthesis are susceptible to synchronic epenthesis. Data for this discussion is taken from a simple experiment. I first collected examples of words where I most expected epenthesis to occur. All the examples contained the same clusters that permitted diachronic epenthesis. The corpus of words was then mixed into a script from which four English informants read into a tape recorder. The tape was then analyzed at both normal and slower speeds in order to discover any abruptness in the transition between sounds. The experiment revealed that not all the subjects epenthesized the same words, suggesting the "free-variation-ness" of epenthesis, and that all the informants epenthesized in environments that had resulted in the sound changes discussed above. Let us examine two sets of data: the first is divided into three subsets according to whether the excrement

sound is bilabial, alveolar, or velar; the second consists of minimal pairs.

## 2.41

### Bilabial excrescence

As was expected an excrescent [p] was heard in transition between a bilabial nasal and fricative. Examples are plentiful: "I am from(p) Chicago," "com(p)fort and warm(p)th," "I'm(p)sipping," "Seventh Sym(p)phony of Chom(p)skey." However, in the cases of assumption and empty, the excrescence is less prominent synchronically. Although speakers often give these a spelling pronunciation when reading a script, more often than not (especially not in *lento* speech) epenthesis is weak. A possible explanation might be, at least in the case of empty, that the sequence [pt] is less susceptible to discrimination because of their joint, not separate, release of the closure after [m]. This is only a speculation since the sequence [pt] does occur in such words as apt, wept, captain, etc. in full force.

Examples of an excrescent [b] occurred in items [aɪtəmbz], drums [drʌmbz] and "My name is Judy Williams" [wɪljəmbz].

### Alveolar Excrescence

Alveolar excrescence is the most common. All speakers would epenthesize between [n] and [s]. Examples include:

circumstance	[sərkəmstənts]	chances	[tʃəntsəz]
conscience	[kənʃjənts]	tense	[tənts]
performance	[pəfɔrmənts]	mince	[mɪnts]
transparency	[trænzpərəntsi]	dense	[dents]
Spanser	[spæntsər]	prince	[prɪnts]

But the word constitution does not become [kənstɪtʃən] because English forbids [tst] clusters at the beginning of a syllable.

The sequence [nʃ] was broken by a stop in the following cases:

conscience	[kəntʃjənts]	pension	[pənʃən]
in Chicago	[ɪntʃɪkəgo]	expansion	[ɪkspənʃən]

The sequence [n] [θ] is exemplified by seventh [sevəntθ]. But not all speakers will produce a [t], because they have an alternative way of

breaking the cluster (dialectal?): they may reduce the nasal before the fricative to yield [səvʔθ]. A native from Fort Myers, Florida, who epenthesised more than the other informants, would even reduce the nasal to something like a glottal stop in monster [maʔstər] (not [mantstər]) and in conscience [kaʔʃjəns]. I cannot provide an explanation for this.)

### Velar Excrescence

The only cases of velar excrescence are kingfish [kɪŋkfɪʃ] and sing Chicago [sɪŋkʃɪkago], and alongside [əlɒŋksaɪd].

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Beside the examples of nasal-fricative clusters, there should be cases of nasal-liquid clusters. However, I suspect synchronic epenthesis in this environment will be less common in the speech of educated persons. There may not be a full segmental "intrusion" as in many of the nasal-fricative examples. I could not detect an epenthesis from any of my informants' pronunciations of grimly, although grimbly is a social dialectal variant (c.f. chimbly, fambly for chimney and family). However, in the case of one speaker's allegro pronunciation of the nonsense word thunner; it sounded very close, but not identical to his pronunciation of thunder [θʌndr].

2.42.

Before we conclude the discussion on synchronic epenthesis it is important to consider some sets of minimal pairs. Consider the following pairs with an epenthetic stop included where expected:

the Chicago Cubs	tell him Chicago	in Chicago
[ðe ʃɪkago kʌbz]	[tɛl hɪmp ʃɪkago]	[ɪntɪkago]

More often than not in allegro speech, there will be an epenthetic stop before the beginning fricative of Chicago. None of my subjects epenthesized in "the Chicago Cubs" because there is no preceding nasal consonant. However, in "tell him Chicago," there may be an epenthesis but it doesn't seem to be fully segmental. At times it was difficult to hear the epenthesis until I played the tape at half-speed. It may be that the [p] could not be fully segmental because English doesn't allow word initial [pʃ]. But in the case of "in Chicago," the epenthesis is quite obvious in everyone's

speech. I became especially aware of this when someone asked me why I say [tʃɪkəgo] instead of [ʃɪkago]. Ignoring the Chicago dialectal variation in the vowel, the fact is that I only say [tʃ] when it is preceded by an [n]. Thus, the pronunciation is not the result of a sound substitution, but rather the result of an epenthesis. (However no epenthesis will occur in a lento pronunciation: in - (pause) - Chicago.)

Next consider these data:

I'm sipping	in sipping
I'm slipping	in slipping.

My informants would epenthesise slightly in the first row [aim<sup>p</sup>sɪpɪŋ], [ɪnt<sup>s</sup>ɪpɪŋ], but not at all in the second row. A possible explanation for this distribution is that in the latter a full epenthesis will create an oversize syllabic structure with a medial four-consonant cluster, while in the former it wouldn't be the case.

Now consider the minimal pair:

Tell him to sing "Chicago" (the song).  
 Tell him to sink Chicago's largest boat.

In the former there is a cluster [ŋʃ] which is available for epenthesis. One speaker only slightly epenthesized a [k] ([sɪŋkʃɪkago]), still keeping the [ŋkʃ] cluster distinct from sink Chicago's [sɪŋk ʃɪkagoz]. However another speaker epenthesized a full segment in sing Chicago making it nondistinct (to me) from sink Chicago's.

Finally consider the pair Spainser [speɪnsər] vs. Spanser [spænsər]. The experiment yielded different degrees of epenthesis. There was little or no epenthesis in the former, while there was epenthetic [ɪ] in the latter. Again, a syllable structure may have been involved in this discriminatory epenthesis. The former contains a long vowel (a diphthong), and an epenthetic segment may disrupt the syllabic balance or make the syllable overly long.

An acoustic analysis of all these examples might provide evidence to the notion of degrees of epenthesis. Why would one speaker produce more of a segment than another speaker? Why in the same phonetic environment

will there be a variation of epenthesis or nonepenthesis even by the same speaker? These are unanswered questions. This perhaps suggests that epenthetic change is not an abrupt process as the generativists claim it to be.

### 3.0.

This paper was set out to survey and discover phonetic facts behind the phenomenon of historical and synchronic epenthesis. It has shown that: (1) homorganic stops will break up nasal-liquid and nasal-fricative clusters, if the new sequence does not create an overlong syllable; (2) diachronic epenthesis is not necessarily the result of the addition of a phonological rule to the grammar (i.e. a change in the competence of a speaker), but it is the effect of performance (i.e. asynchronism of articulation); and, (3) phonology without phonetics fails to give the full colored picture (the handsome prints) of epenthesis.

### FOOTNOTES

<sup>1</sup> Examples of historical changes were collected from introductory books on historical linguistics. See bibliography.

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## A STUDY OF DURATION IN SPEECH PRODUCTION

Marilyn Bereiter

Temporal organization in speech production is a function of the brain's transmission of nervous impulses to the articulatory mechanisms. At this time, it is only a matter of conjecture how or in what sequence the brain "realizes" an idea and then processes lexical, syntactic and phonological requirements before executing a single utterance. It is with the execution of an utterance or a string of utterances that we are concerned here.

An utterance is a sequence of phonological units associated with a time dimension. The smallest phonological unit is a single phoneme which can be considered the most basic speech component. The question being studied is which phonological unit (phoneme, syllable, word, etc.) constitutes the minimal unit of brain transmission. If the phoneme (each with a unique duration) was the basic unit, an impulse would be sent from the brain which would activate articulation of that phoneme. Another impulse would then be transmitted in the same manner, and another -- until the entire sequence of phonemes had been uttered. This would assume that the duration of an utterance would be the sum of the durations of the phonemic components. Studies have shown that if a phoneme is slightly altered in duration, an adjacent phoneme will compensate by adjusting its duration in order to ensure an apparently "scheduled" total duration (Kozhevnikov and Chistovich, 1965).

The problem now is to establish the level or phonological unit in which temporal compensation takes place (Lehiste, 1970). This would determine the minimal unit of speech production. Two of the methods of investigation have yielded two non-compatible conclusions, but each contain statistical validity. Lehiste (1970) showed that steady (/sted+i/) actually had a shorter duration than stead (/sted/) even though there was an additional phoneme/syllable. In one experiment she was able to conclude that neither the phoneme nor the syllable could be the minimal unit of speech production, since in both cases a longer duration for steady would have been anticipated. In this experiment, the domain of temporal compensation seemed to be the word level.

Kozhevnikov and Chistovich (1965) examined the relationships among

the different phonological units with respect to carefully controlled variation in the rate of speech. They assumed the concept of an articulatory program which directs the production of speech segments without temporal consideration. Then the rate of speech characterizes the speed at which the articulatory program is realized. The results of their experiment indicated that with a change in tempo, ratios among phonemes vary significantly (in quick tempo, there was even evidence of total vowel reduction); however, syllables and words retained their same ratios regardless of the rate of speech. Their conclusion was that the articulatory program is based on the syllable as the minimal unit of production.

The work that follows is based on the work of Kozhevnikov and Chistovich (1965) following the premise that the syllable is the minimal unit of speech production. The study involves repetition of a single sentence at different tempos and a statistical analysis of the ratios between each phonological level.

The sample sentence was: The tiger pounced onto the streaking chimpanzee. This sentence breaks down into 32 phonemes, 12 syllables, 7 words and 2 phrases (see Figure 1). Care was taken in choosing a sentence that contained distinct and unambiguous segmental boundaries. Lehiste (1972) discussed the perceptual reality of segmentation and concluded that the production and perception of timing patterns is relative to changes in manner of articulation. These changes are manifested quite clearly in the visual display of the acoustic waveform. With this in mind, it was desirable to intentionally alternate voiced and voiceless segments. The sample sentence also had to be long enough so as to minimize the effects of intonation. Since I wanted to determine relationships among units at different levels, the sentence had to contain more than one phrase as well as polysyllabic words and polyphonemic syllables.

There was only one subject who spoke the sentence three times each at three different tempos, beginning with a normal rate of speech, then quickening the pace and finally decreasing the tempo to a sub-normal rate. The tempo intervals were rather arbitrary and subjective; a discussion of their repercussions will be included later. The subject spoke directly into a microphone that was connected to a Siemens Oscillomink. The signal was amplified and then broken down into components and analyzed. The

analysis was then simultaneously charted on calibrated paper at the rate of 10 cm/sec. In order to determine the duration of each segment, the acoustic waveforms as well as the amplitude displays had to be studied.

By measuring the length of each segment represented on the oscillograms, I was able to quantify the data in units of seconds. I had nine separate samples belonging to three (hopefully) distinct groups or populations. Since I was interested in the ratios between phonological units of the same structural level, I calculated a percent for each unit representing that unit's fraction of the next higher level. For example, in Table 1a,  $P_1$  represents 34.6% of  $S_1$  in the slow group while  $P_2$  represents 65.4% of  $S_1$ . In Table 1c,  $W_1$  is 16.0% of  $Ph_1$  and  $W_2$  is 84.0% of  $Ph_1$  also in the slow group. A mean was first computed from the raw data (in seconds) and then the percent was determined rather than first computing the percents and then taking a mean percent. This was done in order to minimize variance within the groups in an effort to consider the groups as representing three distinct speeds rather than a continuum.

After the percents had been calculated, I was interested in analyzing how well correlated each level (phonological unit) of each tempo was with the other tempos of that level. A multivariant analysis gave the following correlation coefficients:

UNIT	FAST:NORMAL	NORMAL:SLOW	FAST:SLOW
phoneme	0.977	0.960	0.975
syllable	0.999	0.977	0.996
word	0.999	0.998	0.999
phrase	1.000	1.000	1.000

The results indicated that each group was so highly correlated that something must have been askew. Though the correlations do improve (approach +1) as the phonological units increase (which would be anticipated by my hypothesis), it was impossible to draw any valid conclusions from this test. I decided to go back a step to investigate why all of the groups were so highly correlated.

By examining the standard deviations of the means (in seconds) for each tempo (Table 2), the overlap between groups indicates that they are

not at all distinct; and in fact, most groups (especially at the phoneme level) belong to the same population. Therefore, it is not at all surprising to find the high correlation coefficients, since one would expect a coefficient of +1 when correlating a group with itself.

I would like to say that we could look for a few tendencies or generalities relating to the original hypothesis; but given the questionable nature of these statistics, anything deduced from them would lack validity. However, I cannot refrain from pointing out one interesting observation: in Table 2 as the level increases, there exists a seemingly significant increase in the distinctness of the groups. This is perhaps due to the very essence of the problem. Each group at the sentence level is unquestionably (statistically) and empirically distinct. With each reduction in level (decreasing the block of time that the component units comprise), the amount of variability also is reduced. At the phoneme level there is only one possible variable that could contribute to the tempo discrimination. According to Kozhevnikov and Chistovich (1965), certain phonemes (especially consonants) have very discrete duration limits whereas the vowels can increase or decrease in length almost infinitely. I had hoped to be able to point to a particular level and say that it was the minimal unit of production.

The inconclusiveness of this study is not due to a wrong hypothesis but rather to a non-rigorous experimental procedure. (The hypothesis may or may not be correct but it is impossible to make any judgment based on these data.) Instead, a more precise timing mechanism must be implemented to ensure the distinctness of each tempo. Kozhevnikov and Chistovich (1965) used a buzzer that sounded when the utterance was to have been ended. This enabled the subjects to pace themselves; and with some practice, a normalized tempo for each rate of speech could be achieved. With such a mechanism, the sample size could easily be increased which would further ensure a more valid statistical analysis.

Depending on the results of a future experiment testing the same hypothesis, further investigation should be focused towards solving the discrepancy between the results Lehiste (1970) achieved with her method of experimentation and those deduced by Kozhevnikov and Chistovich (1965). One possible procedure could include Lehiste's general approach of com-

paring pairs of words like stead and steady but incorporating them into a longer utterance. This would minimize any distortions in duration that might be caused by intonation of words in isolation.

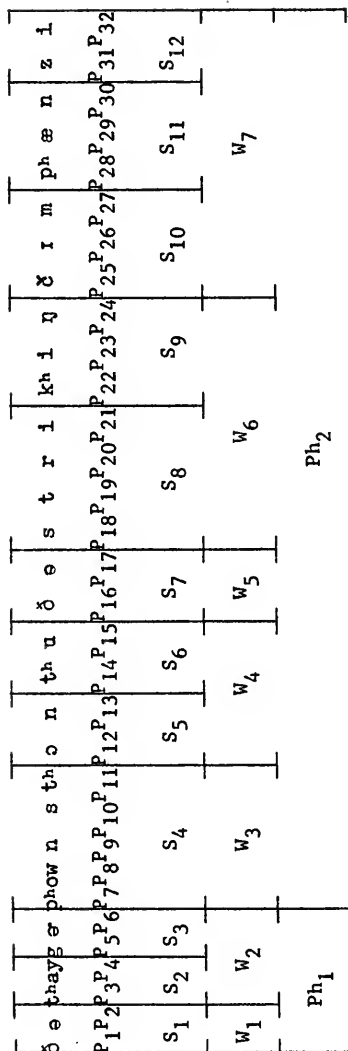


Figure 1.

Segmentation of the sentence: The tiger pounced onto the streaking chimpanzee.

Key: P = phoneme  
S = syllable  
W = word  
Ph = phrase



Table 1a.

<u>Phoneme</u>	<u>Percent of Syllable for Three Rates of Speech</u>		
	FAST	NORMAL	SLOW
P <sub>1</sub>	36.1	33.0	34.6
P <sub>2</sub>	63.9	67.0	65.4
P <sub>3</sub>	56.0	51.1	57.8
P <sub>4</sub>	44.0	48.9	42.2
P <sub>5</sub>	44.1	40.5	40.4
P <sub>6</sub>	55.9	59.5	59.6
P <sub>7</sub>	27.7	24.4	27.5
P <sub>8</sub>	30.4	34.3	33.0
P <sub>9</sub>	11.3	11.7	09.3
P <sub>10</sub>	18.5	15.7	18.7
P <sub>11</sub>	12.1	13.9	11.4
P <sub>12</sub>	68.8	69.5	65.4
P <sub>13</sub>	31.2	30.5	34.6
P <sub>14</sub>	62.4	60.8	66.5
P <sub>15</sub>	37.6	39.2	33.5
P <sub>16</sub>	41.7	46.2	50.9
P <sub>17</sub>	58.3	53.8	49.1
P <sub>18</sub>	49.3	44.6	49.1
P <sub>19</sub>	13.7	15.3	12.4
P <sub>20</sub>	11.1	14.0	09.5
P <sub>21</sub>	25.9	26.1	28.9
P <sub>22</sub>	46.4	40.1	43.0
P <sub>23</sub>	36.7	36.3	42.0
P <sub>24</sub>	16.9	23.6	15.0
P <sub>25</sub>	51.4	60.2	49.5
P <sub>26</sub>	20.2	23.4	19.1
P <sub>27</sub>	28.3	16.4	31.3
P <sub>28</sub>	28.4	27.6	25.2
P <sub>29</sub>	45.7	43.1	43.2
P <sub>30</sub>	25.8	29.3	31.6
P <sub>31</sub>	36.9	36.7	34.8
P <sub>32</sub>	63.1	63.3	65.2

Table 1b.

Syllable Percent of Word for Three Rates of Speech

	FAST	NORMAL	SLOW
S <sub>1</sub>	100.0	100.0	100.0
S <sub>2</sub>	65.6	64.0	60.3
S <sub>3</sub>	34.4	36.0	39.7
S <sub>4</sub>	100.0	100.0	100.0
S <sub>5</sub>	54.6	56.3	54.5
S <sub>6</sub>	45.4	43.7	45.5
S <sub>7</sub>	100.0	100.0	100.0
S <sub>8</sub>	53.3	51.9	51.0
S <sub>9</sub>	46.7	48.1	49.0
S <sub>10</sub>	29.0	26.7	28.8
S <sub>11</sub>	45.5	47.4	45.2
S <sub>12</sub>	25.5	25.9	25.9

Table 1c.

Word Percent of Phrase for Three Rates of Speech

	FAST	NORMAL	SLOW
W <sub>1</sub>	16.6	17.2	16.0
W <sub>2</sub>	83.4	82.8	84.0
W <sub>3</sub>	21.0	22.4	23.6
W <sub>4</sub>	13.1	13.7	13.9
W <sub>5</sub>	05.4	05.1	05.1
W <sub>6</sub>	22.6	23.1	21.4
W <sub>7</sub>	38.0	35.7	36.0

Table 1d.

Phrase Percent of Sentence for Three Rates of Speech

	FAST	NORMAL	SLOW
Ph <sub>1</sub>	18.2	18.5	17.4
Ph <sub>2</sub>	81.8	81.5	82.6

Table 2a.

Mean Duration and Standard Deviation  
of Phonemes for Three Rates of Speech

	no overlap*	FAST		NORMAL		SLOW	
		$\bar{X}^{**}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
P <sub>1</sub>		.030	.010	.033	.012	.037	.006
P <sub>2</sub>		.053	.006	.067	.031	.070	.010
P <sub>3</sub>		.153	.015	.157	.015	.197	.006
P <sub>4</sub>		.120	.017	.150	.000	.143	.012
P <sub>5</sub>		.063	.012	.070	.010	.090	.010
P <sub>6</sub>	x	.080	.000	.103	.012	.133	.006
P <sub>7</sub>		.130	.010	.140	.010	.207	.006
P <sub>8</sub>	x	.143	.006	.197	.006	.247	.006
P <sub>9</sub>		.053	.006	.067	.021	.070	.010
P <sub>10</sub>		.087	.032	.090	.010	.140	.000
P <sub>11</sub>		.057	.021	.080	.026	.087	.006
P <sub>12</sub>		.110	.010	.137	.015	.157	.006
P <sub>13</sub>		.050	.010	.060	.010	.083	.012
P <sub>14</sub>		.083	.015	.093	.015	.133	.015
P <sub>15</sub>		.050	.017	.060	.010	.067	.015
P <sub>16</sub>		.050	.010	.060	.010	.083	.012
P <sub>17</sub>		.070	.000	.070	.000	.080	.010
P <sub>18</sub>		.133	.021	.137	.032	.170	.010
P <sub>19</sub>		.037	.006	.047	.015	.043	.006
P <sub>20</sub>		.030	.000	.043	.015	.033	.006
P <sub>21</sub>		.070	.000	.080	.017	.100	.010
P <sub>22</sub>		.110	.010	.113	.012	.143	.006
P <sub>23</sub>		.087	.015	.103	.015	.140	.010
P <sub>24</sub>		.040	.010	.067	.015	.050	.010
P <sub>25</sub>		.133	.012	.147	.023	.163	.006
P <sub>26</sub>		.050	.000	.057	.006	.063	.006
P <sub>27</sub>		.070	.000	.090	.010	.103	.006
P <sub>28</sub>		.110	.017	.120	.010	.130	.017
P <sub>29</sub>		.143	.065	.187	.015	.223	.015
P <sub>30</sub>		.100	.010	.127	.021	.163	.031
P <sub>31</sub>		.080	.010	.089	.006	.103	.006
P <sub>32</sub>		.137	.012	.150	.020	.193	.021

\* indicates each group is a separate population

\*\* in seconds

Table 2b.

Mean Duration and Standard Deviation  
of Syllables for Three Rates of Speech

	no overlap	FAST		NORMAL		SLOW	
		$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
S <sub>1</sub>		.083	.015	.100	.040	.107	.015
S <sub>2</sub>		.273	.025	.307	.015	.340	.010
S <sub>3</sub>	x	.143	.012	.173	.015	.223	.012
S <sub>4</sub>	x	.470	.010	.573	.049	.750	.000
S <sub>5</sub>	x	.160	.010	.197	.012	.240	.010
S <sub>6</sub>	x	.133	.012	.153	.006	.200	.020
S <sub>7</sub>		.120	.010	.130	.010	.163	.006
S <sub>8</sub>		.270	.020	.307	.025	.347	.015
S <sub>9</sub>	x	.237	.015	.283	.012	.333	.025
S <sub>10</sub>		.253	.012	.293	.029	.330	.010
S <sub>11</sub>	x	.387	.015	.433	.015	.517	.051
S <sub>12</sub>		.217	.015	.237	.025	.297	.023

Table 2c.

Mean Duration and Standard Deviation  
of Words for Three Rates of Speech

	no overlap	FAST		NORMAL		SLOW	
		$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
W <sub>1</sub>		.083	.015	.100	.040	.107	.015
W <sub>2</sub>	x	.417	.015	.480	.020	.563	.006
W <sub>3</sub>	x	.470	.010	.573	.049	.750	.000
W <sub>4</sub>	x	.293	.015	.350	.010	.440	.026
W <sub>5</sub>		.120	.010	.130	.010	.163	.006
W <sub>6</sub>	x	.507	.035	.590	.026	.680	.035
W <sub>7</sub>	x	.857	.031	.963	.064	1.143	.042

Table 2d.

Mean Duration and Standard Deviation  
of Phrases for Three Rates of Speech

		FAST		NORMAL		SLOW	
no overlap		$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
Ph <sub>1</sub>	x	.500	.010	.580	.035	.670	.020
Ph <sub>2</sub>	x	2.247	.080	2.607	.125	3.177	.049

Table 2e.

Mean Duration and Standard Deviation  
of Sentence for Three Rates of Speech

		FAST		NORMAL		SLOW	
no overlap		$\bar{X}$	sd	$\bar{X}$	sd	$\bar{X}$	sd
Sentence	x	2.747	.075	3.187	.129	3.847	.051

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A STUDY OF ASPIRATED CONSONANTS  
 AS SPOKEN AND RECOGNIZED BY HINDI SPEAKERS<sup>1</sup>

Tej K. Bhatia

0. Introduction

The aims of this restricted study are as follows:

- a) to analyze the perceptual pattern of Hindi aspirated consonants as spoken and recognized by native speakers;
- b) to examine the predictive role of phonetic sciences in the light of the recent theory of aspiration propounded by Kim (1970);
- c) to determine the phonological phenomena involving aspiration in Hindi.

In Hindi, as in other Indo-Aryan languages, the consonant system has many contrasts involving aspiration and voicing as is shown in the following table.

Stops	Unvoiced Unaspirated	Unvoiced Aspirated	Voiced Unaspirated	Voiced Aspirated
Velar	k ( क )	kh ( ख )	g ( ग )	gh ( घ )
Palatal	c ( च )	ch ( छ )	j ( ज )	jh ( झ )
Retroflex	T ( ट )	TH ( ठ )	D ( ड )	DH ( ढ )
Dental	t ( त )	th ( थ )	d ( द )	dh ( ध )
Bilabial	p ( प )	ph ( फ )	b ( ब )	bh ( भ )

-----  
 Flap Unaspirated R ( र )

Aspirated RH ( ऋ )

Hindi orthography (Devnagri script) reflects these phonemic contrasts faithfully as can be seen in the Devnagri representation given in parentheses. One note about the distribution of these sounds: Retroflex [D] and [DH] do not occur in word final position and [R] and [RH] do not occur in initial position.

1.0. Project Design and its Importance

I first devised a perception test for the aspirated sounds of Hindi. The aim of the test was to present an account of "perceptual confusion",

and to establish the "hierarchy of difficulties" on the part of native speakers. I feel that this project is significant for the following reasons:

First, it examines a correlation between the production and perception of the aspirated consonants when spoken and recognized by native speakers.

Second, it examines the predictions made by the recent theory of aspiration (see Kim 1970; Lisker and Abramson, 1964).

Third, I feel that this investigation may have pedagogical merits such as the learning and teaching of aspirated stops of Hindi to the foreign language learner. In the teaching of Hindi, pronunciation of aspirated stops presents a great problem.

## 2.0. Review of Earlier Research

In the area of acoustic studies of Hindi the most significant work has been done by Gupta, Agrawal and Ahmad (1969), and Ahmad and Agrawal (1969). In their experiment, they revealed the significant features in the perception of normal Hindi consonants as well as in clipped speech. Their findings are as follows:

(1) Initial and final consonants are not similar in their perceptual recognition; and

(2) The average effect of clipping on features follows the order (1). (2) nasality, (3) flapped liquids, (4) liquids, (5) continuants, (6) voicing, (7) frication, (8) aspiration, and (9) affrication; i.e., the place of articulation is the most important in the intelligibility of any sound, and affrication is least important. The higher the rank, the higher the intelligibility. Earlier, Black and Singh (1966), in their experiment with four language groups, namely, English, Hindi, Arabic and Japanese, also pointed out the significant features in perception. A summary of their rank-order is given below: (1) nasality, (2) place, (3) voicing, (4) friction, (5) liquid, (6) duration, (7) aspiration. The focus of above experiments was not aspiration. The same is true about the linguistically-oriented work done by Gandhi and Jaggi (1971). They worked out a contrastive study of selected data of one and two syllable words. These words have been presented within a context and as isolated items. In this paper nothing is mentioned about the kind and scope of data, and about the listening and recording conditions. As this contrastive study provides an overall comparison of



English and Hindi sound systems, aspiration is not the main focus of this experiment.

My project is completely restricted to aspiration and in this sense it is perhaps the first investigation of this phenomenon in Hindi.

### 3.0. Methodology

In this experiment, three kinds of different methodological procedures have been adopted.

3.1. Preparation of a Perception Test Tape

3.2. Preparation of a Confusion Matrix

3.3. Preparation of a Perception Test

I shall discuss these below.

#### 3.1. Preparation of a Perception Test Tape

This process involves four steps:

3.1.1. Data Collection. A context-free data of a minimal pair of a set of 22 consonants in the initial, middle and final positions was collected. Minimal pairs of the following types were selected:

(1) unvoiced unaspirated vs. unvoiced aspirated;

(2) voiced unaspirated vs. voiced aspirated.

Out of the above two types, the minimal pairs from both sets were collected except in such cases where examples from only one or the other type could not be found.

The total number of items in the data is 62, with the following syllabic structures:

CVC (37)

CVCVC (18)

CVCV (3)

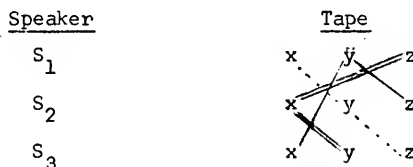
VC (2)

VCC, VCV (1 each)

Both meaningful and nonsensical (but phonologically possible) pairs of words were included in the data. There was no other special consideration involved in the selection of the data.

3.1.2. Recording of randomized data. The randomized data was read by three native speakers<sup>2</sup> of Hindi. The recording of this data was made in the University of Illinois Phonetics Laboratory, at the speed of 33/4 I.P.S.

3.1.3. Further randomization of the data. In order to include all 62 items but to maintain the random nature of the data, the recording of each speaker, say  $S_1$ ,  $S_2$  and  $S_3$  was cut at two uniform points. Thus, the recording of each speaker was divided into three parts, say x, y and z and was joined together as shown in the diagram.



This tape (which I shall call  $T_1$ ) included three readings and each reading contained the voice of three informants.

3.1.4. The final version of the perception test. The final version of the perception test tape ( $T_2$ ) was prepared by copying tape  $T_1$  and by inserting necessary instructions. In  $T_2$ , sufficient space was inserted between each item so as to allow the subjects enough time to mark their responses.

### 3.2. Preparation of the confusion matrix.

The test matrix<sup>3</sup> of 62 x 4 was constructed by presenting the minimal pairs of every correct item. For example, if the correct recorded item is /kər/, the test matrix was prepared in the following way: /kər/, /khər/, /ger/, /ghər/.

### 3.3. Presentation of the perception test.

The perception test was played in the phonetic laboratory of the University of Illinois and twenty native speakers of Hindi heard it in two groups.

## 4.0. Results

Tables I, II, and III represent the distribution of the records made by the subjects in the initial, middle and final positions respectively. The consonants given along the horizontal axis represent the sound which was perceived by the subjects and the consonants along the vertical axis indicate the consonants which were spoken by informants. For example, in Table I, the third line indicates that /g/ was spoken in initial position. Out of 60 occurrences of /g/, two times it was perceived as /gh/, once as

/k/, 57 times correctly as /g/, and zero times as /kh/. Thus, out of 60 occurrences of /g/, 57 times it was correctly responded and 3 times it was misheard.

The diagonal represents the correct responses given by the subjects while readings on the left and right of it denote errors. In the tables, TC stands for "Total Confusion" which is the sum of all the readings which appear on the left and right of the diagonal.

The results presented in these tables (I, II and III) are summarized below:

(1) In all positions, unvoiced unaspirated consonants, such as /k, c, t, T and p/ were mistaken more often than unvoiced aspirated consonants. In initial position the only exception was /ph/, and in medial position the only exception was /th/. In those cases, /ph/ and /th/ were more confused than /p/ and /t/. However, statistics show that these two exceptions are insignificant.

(2) In initial and medial positions, voiced aspirated consonants were more frequently confused than voiced unaspirated consonants. The exception was /gh/ in medial position.

(3) In contrast to initial and medial position, the confusion in voiced unaspirated consonants was greater than in voiced aspirated consonants in final position. The only exception was /g/.

(4) The rate of confusion in the palatal series was much higher than the rate of confusion which took place in other series.

Thus, the above results indicate that subjects reacted differently in final position, and in initial and medial position in the case of voiced aspirated consonants.

Table IV shows the first probable errors and presents a clear picture of mistakes made by the subjects. The rate of confusion was very low in second probable error; that is why it is omitted in Table IV. The probable error is drawn from the readings of Table I, II, and III. First probable error refers to the most frequent mistake. For example if /g/ is mistaken five times for /k/, and three times for /kh/, then the first probable error for /g/ is /k/ and the second probable error is /kh/.

The most important error is the first probable error. The error which is responsible for 25% or more of the confusion is marked as significant

error and is indicated by a line under it, and if 5% or less confusion is caused by an error, that error is considered to be insignificant and is indicated by a star. The two second probable errors were significant in final position. The rate of confusion of /g/ and /t/dh/ for /k/ and /d/ respectively was considerably high in this position.

Table IV also shows that the confusion occurred most frequently between the consonant classes which can be distinguished by a single feature, i.e., either by aspiration or by voicing.

Table V presents the rank ordering of features. The rank ordering has been expressed in terms of one feature as well as in two features. The rank ordering of the consonants is determined by adding the total number of confusions which took place in the perception of those consonants. First, the ranks have been established according to initial, medial and final positions, i.e. information transmitted by Tables I, II, and III, respectively. For example, if a consonant is confused the least, then rank 4 is assigned. On the other hand, if a consonant is misheard most frequently in any position, it is assigned rank 1. Second, by summing up the ranks in all the positions, the combined rank is determined. If the sum of all the three positions is least, rank 1 is assigned and if it is highest, rank 4 is allotted. The rank of 1 indicates the highest number of confusions and the rank of 4, the least number of confusions.

The labels in Table V are explained below:

a) [- Aspirate] indicates that unaspirated consonants such as k and g are mistaken for kh and gh respectively.

b) [+ Aspirate] presents the opposite case of (a).

c) [+Voiced] indicates that voiced consonants such as g and gh were misheard as unvoiced consonants k and kh respectively.

d) [- Voiced] shows that confusion was caused as a result of the addition of voicing, i.e. unvoiced consonants such as k and kh were mistaken for voiced consonants g and gh respectively. Rank-ordering in terms of two features is presented below:

a)  $\begin{bmatrix} + \text{voiced} \\ + \text{aspirated} \end{bmatrix}$  refers to the reverse case of b.

b)  $\begin{bmatrix} - \text{voiced} \\ - \text{aspirated} \end{bmatrix}$  means unvoiced unaspirated consonants are mistaken for voiced aspirated, i.e. consonants like k are mistaken for gh.

- c)  $\begin{bmatrix} + \text{voiced} \\ - \text{aspirated} \end{bmatrix}$  expresses that the consonants such as g and j are mistaken for kh and ch respectively.
- d)  $\begin{bmatrix} - \text{voiced} \\ + \text{aspirated} \end{bmatrix}$  shows that unvoiced aspirated consonants were mistaken for voiced unaspirated consonants such as the confusion of ch for j.

It can be seen that the confusion of unaspirates in all positions is the highest of all. Consequently, [-aspirated] has the highest rank while [-voiced] has the lowest. The confusion which took place in terms of the two features seems to be insignificant except in the final position.

### 5.0. Discussion

In a recent study, an attempt was made to explain aspiration in terms of "voicing lag" (see Lisker and Abramson, 1964; Kim, 1970<sup>4</sup>). Aspiration is explained in terms of two reference points, i.e. (a) release of closure of a stop; and (b) the onset of voicing.

Since in final position one reference point, i.e. onset of voicing is lost, the theory implies that aspiration will be neutralized in word final position. This theory also predicts that aspiration is neutralized before another voiceless consonant since once reference point responsible for the onset of voicing is lost.

Below I will examine the predictions made by this theory of aspiration.

In final position my results indicate that aspirated consonants are recognized more correctly than unaspirated ones, while unaspirated consonants are mistaken more frequently in that position. An experiment which I performed with native speakers of English appears to support this finding (see Bhatia: 1973).

The experiment which involved 25 American students who had undergone one semester of intensive Hindi training showed that they confused voiced aspirated consonants more often than voiced unaspirated in initial and medial positions. This is understandable in view of the fact that voiced aspirated sounds are not present in English. However, in final position, not only could they recognize voiced aspirated consonants more correctly than voiced unaspirated, but also the rate of the perception of unvoiced aspirated consonants was significantly higher than that of unvoiced unaspirated.

Although this may be due to the fact that English stops are as a rule aspirated, I feel that the identical results expressed by two separate experiments cannot just be a coincidence. It indicates that aspiration in the final position without the following voice onset nevertheless carries some cues which enable the native speaker as well as the foreign learner of Hindi to recognize it relatively easily. It may be that this cue is release ('a puff of air') vs. non-release of a stop. The spectrograms show that although the degree of aspiration is weaker in final position, it is not completely absent.

At this point, it will not be irrelevant to consider the case of Kashmiri which has the following rule:

$$C \rightarrow C^h / \_\_\#$$

This rule accounts for word final unaspirated consonants of Hindi becoming aspirated in final position in Kashmiri. For example, səbək (H) → səbəkʰ (k), 'lesson' gloss?; nəzdik (H) → nəzdikʰ (k), 'near' gloss. The Kashmiri example indicates that some languages tend to retain word final aspiration and it seems that Hindi has a potential to share this property with languages such as Kashmiri.

Furthermore, the phonological description of Hindi indicates that clusters (phonetic sequence) such as C<sup>h</sup>C can occur in Hindi (Ohala 1972). This observation runs counter to the second prediction of the theory of aspiration.

In short, I have tried to show that Hindi retains some perceptual cues which enable the subjects to detect aspiration in final position. However, this observation does not undermine the theory of aspiration and the predictive role of the phonetic sciences for the following reasons:

1) The informants may have overpronounced the aspiration in final position while reading the words in isolation. In other words, the context-free nature of the data could be responsible for the results obtained. This would be the case especially if the three reading subjects realized that they were asked to contrast aspiration (and voicing).

2) The occurrence of C<sup>h</sup>C-type clusters is not supported by a phonetic experiment.

Thus, further experiments embedding the above data into the minimal pairs of sentences are needed to validate the results obtained in the present experiment.

## 6.0. Summary

The following conclusions can be drawn from the above discussion. First, unvoiced unaspirated consonants are more confused than unvoiced aspirated consonants in all positions. Second, voiced aspirated consonants behave differently: 1) in initial and medial position; and 2) in final position. In initial and medial positions they are mistaken more often while they are better recognized in final position. Third, the confusion occurred primarily between the consonant classes which can be distinguished by a single feature, i.e., either by aspiration or by voicing. Fourth, unaspirated segments were more frequently confused than aspirated ones, while [ - voicing ] had the lowest rank, i.e. the least confusion took place in the perception of voiceless unaspirated segments. Fifth, the rate of confusion in the palatal series was much higher than the rate of confusion which took place in other series.

## NOTES

<sup>1</sup>I wish to express my thanks to Professor C.W. Kim for his help in planning and conducting this experiment and for his suggestions and comments on the earlier version of this paper.

<sup>2</sup>I had three informants: two males (myself and Mr. Anil Arora) and one female, Mrs. Vimala Mohan. They are from Delhi, Pant Nagar (U.P.), and Lucknow (U.P.) respectively. My thanks are due to them.

<sup>3</sup>I am thankful to Mrs. Y. Kachru for the various suggestions in selecting data and for helping me design the test matrix.

<sup>4</sup>Kim's explanation of aspiration differs from Lisker and Abramson in terms of underlying control mechanism. Kim agrees that aspiration is laryngeally controlled. But what is controlled by the laryngeal muscles in the case of aspiration is not the timing of glottal closing (Lisker and Abramson's view) but the size of the glottal opening.

Manjari and John Ohala refute Chomsky and Halle's claim that heightened sub-glottal air pressure is a necessary characteristic of all aspirated consonants. According to them, during h and upon the release of the aspirated stops there occurs a moment when there is no oral constriction and when the glottal resistance is markedly lower than that of normal voicing. Given such lowered resistance to the lung air, the air naturally rushes out in great volume, and consequently, the air pressure just below the glottis is momentarily lowered.

	k	kh	g	gh	c	ch	j	jh	T	TH	D	DH	t	th	d	dh	p	ph	b	bh	R	RR	TC
k	60	0	0	0																			0
kh	0	60	0	0																			0
g	1	0	57	2																			3
gh	0	0	5	55																			5
c					59	1	0	0															1
ch					0	60	0	0															0
j					3	0	57	0															3
jh					C	19	0	41															19
T									58	0	2	0											2
TH									0	60	0	0											0
D									0	0	60	0											0
DH									0	0	1	59											1
t													59	1	0	0							1
th													0	59	0	1							1
d													0	0	60	0							0
dh													0	0	0	60							0
p																	60	0	0	0			0
ph																	1	59	0	0			1
b																	2	0	58	0			2
bh																	0	2	1	57			3

Table 1: Error Matrix for Initial Consonant. Maximum response number is 60.

TC represents Total Confusion.



	k	kh	g	gh	c	ch	j	jh	T	TH	D	DH	t	th	d	dh	p	ph	b	bh	F	RH	TC
k	59	0	1	0																			1
kh	1	59	0	0																			1
g	4	1	55	0																			5
gh	0	2	0	58																			2
c					59	0	0	1															1
ch					0	60	0	0															0
j					0	0	60	0															0
jh					0	19	0	41															19
T									58	2	0	0											2
TH									0	60	0	0											0
D									0	0	60	0											0
DH									0	2	0	58											2
t													59	1	0	0							1
th													0	58	0	2							2
d													0	0	60	0							0
dh													0	2	2	56							4
p																	58	2	0	0			2
ph																	0	60	0	0			0
b																	0	0	60	0			0
bh																	0	0	0	60			0
R																							43
RH																							17

Table 2: Error Matrix for Middle Consonants. Maximum response number is 60.

TC represents Total Confusion.

	k	kh	g	gh	c	ch	j	jh	T	TH	D	DH	t	th	d	dh	p	ph	b	bh	R	RH	TC
k	54	5	1	0																			6
kh		1	59	0	0																		1
g		6	8	43	3																		17
gh		2	2	26	30																		30
c					34	25	1	0															26
ch						1	58	1	0														2
j						12	1	44	3														16
jh						4	4	3	49														11
T									54	6	0	0											6
TH										1	58	1	0										2
t													47	8	3	2							13
th														0	60	0	0						0
d													22	5	33	0							27
dh													5	9	8	38							22
p																	51	7	2	2	0		9
ph																		52	2	1			8
b																			1	43	16		17
bh																							11
R																				1	2	8	49
RH																							21
																							39
																							26
																							94
																							13

Table 3: Error Matrix for Final Consonants. Maximum response number is 60 (except RH = 120). TC represents Total Confusion.

Table 4. Probable error matrix (for Table I, II, and III) for initial, middle and final consonants.

<u>First Probable Error</u>				
Consonants	Initial Position	Middle Position	Final Position	Error
k	--	g*	kh	kh
kh	--	k*	k*	k*
g	gh	k	kh	k/kh/gh
gh	g	kh	<u>g</u>	<u>g</u>
c	ch*	jh*	<u>ch</u>	<u>ch</u>
ch	--	--	c/j*	c/j*
j	--	--	c	c
jh	<u>ch</u>	<u>ch</u>	c/ch	<u>ch</u>
T	D	TH	TH	TH/D
TH	--	--	T/D*	T/D*
D	--	--		
DH	D*	TH		TH
t	th*	th*	th	th
th	t*	dh	--	dh
d	--	--	<u>t</u>	<u>t</u>
dh	--	d/th	th	th
p	--	ph	ph	ph
ph	p*	--	p*	p*
b	p	--	<u>bh</u>	
bh	ph	--	b	ph/b
R	--	<u>RH</u>	<u>RH</u>	<u>RH</u>
RH	--	--	R	R

\* represents insignificant error (confusion of 5% or less)

Underlined consonants are significant errors (confusion of 25% or more).

Table 5. Rank Order of the Perceptually Confused Consonants

One Feature	Initial Position	Middle Position	Final Position	Combined Rank Order
[- aspirate]	2	2	1	1
[+ aspirate]	3	3	2	2
[+ voiced]	4	1	3	2
[- voiced]	1	4	4	3
-----				
Two				
<u>Features</u>				
[ + voiced + aspirate ]	0	0	2	1
[ - voiced - aspirate ]	0	1	4	4
[ + voiced - aspirate ]	0	1	1	1
[ - voiced + aspirate ]	0	0	3	2

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MORPHOLOGICALLY CONDITIONED CHANGES IN WANKA-QUECHUA

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0. Purpose. The purpose of the present paper is twofold: (a) to provide evidence that shows the existence of genuine grammatically conditioned sound changes; and (b) to construct a working hypothesis to the effect that certain rules can become generalized from derived to non-derived environments in the Kiparskyan sense. With these two goals in mind I shall present a number of instances of phonological change affecting certain grammatical categories only, and at the end it will be shown that some of these changes which began affecting suffixes, only after eroding them propagate by generalization to the entire system. The data used come from the Wanka variety of Quechua. For each change I will try to delimit its exact distribution interlectally as well as intra-systematically, and references to similar changes attested in other Quechua lects will also be made.\*

0.1. Lectal and Geographic Location. Wanka-Quechua is a variety that belongs to one of the main branches (Quechua I) into which the Quechua language family is divided. It is spoken on the Central Highlands of Perú, along the Mantaro Valley, covering roughly three provinces of the Department of Junín (from South to North, Huancayo, Concepción, and Jauja). This variety consists of at least three lects<sup>1</sup> called (from South to North) Waylla-Wanka, Waycha-Wanka, and Shawsha-Wanka; these lects correspond roughly to the political division among the three provinces mentioned above. Each lect, on the other hand, appears fragmented with respect to the treatment of a number of phonological rules. This peculiar situation makes it difficult -- if not impossible -- to establish relatively discrete varieties within the supralectal entity which we call Wanka (itself an abstraction defined on the basis of certain shared rules) unless one embraces the rather unrealistic approach to language variation, namely the so-called static paradigm, as opposed to the dynamic model<sup>2</sup> practiced by the variously called sociolinguists, variationists, etc. Thus, it should be remarked at this point that the variety we are concerned with is a highly fragmented entity. In fact, the lectal differentiation is so

strong that, to speak solely of the regional variation, not only do we see differences from region to region but also from town to town, from one village to another. As far as intelligibility is concerned, I must say that, in spite of the surface differences, the speaker of different communiolects understand each other (although certain degrees of asymmetry can be detected), being almost all of them, literally speaking, polylectals. This knowledge on the part of the speakers is, I think, an aspect of their linguistic competence, and we would like to capture precisely this knowledge, since that is the goal of a linguistic description. To this effect, one only needs to compare the varieties among themselves and thereby establish the basic grammar from which, by means of rules of lectal differentiation, we can derive the actual pronunciation for each variety. Thus in the remainder of this paper I shall assume the correctness of a panlectal grammar, as opposed to an idiolectal grammar, without further discussion<sup>3</sup>.

1.0. Grammatical Information and Sound Change. That some synchronic phonological rules require, in order to be formulated, certain categorial information has largely been accepted (sometimes by way of analogy) even by those who followed closely the strong version of the neogrammarian view that sound change takes place only in purely phonetic environments. This is because in an historical perspective it is generally the case that most of the grammatically conditioned rules were originally phonetically motivated, and as such do not contradict the "regularist" view of sound change. On the other hand, the possibility of a sound change morphologically conditioned from its very beginning was rejected, since this goes against the very heart of the neogrammarian doctrine. However, there can be no doubt that phonological change can take place in nonphonetic environments; in fact the notion of word boundary was largely invoked, although most of the times under the disguise of "phonetic pauses". It is because of the existence of a wide array of evidence that shows the grammatical conditioning of certain phonological rules that generative grammar maintains the view that sound changes cannot always be stated in strictly phonetic terms, and therefore this model has more empirical validity, as opposed to other theories strongly limited by what Chomsky has called the "local determinacy" principle. Here it should be noted however that even if we know that the strong version of the neogrammarian view is empirically incorrect, it can hardly be disposed



of entirely, since its value as a heuristic principle is out of question. This is because, as Anttila (1972:79) observes, "even if it is easy to formulate a grammatically conditioned sound change, it need not be historically correct". As we have said, synchronically, certain grammatically conditioned alternations are the by-product of earlier perfectly phonologically motivated rules. This seems true, for example, of the Iroquian sound changes reported by Postal (1968: Chap. 11) which were then presented as evidence for the disconfirmation of the neogrammarian theory of sound change. Postal claimed that among certain Iroquian languages perfectly regular sound changes can be grammatically conditioned in origin. However, Kiparsky (1973) demonstrated quite convincingly that the Iroquian case discussed by Postal is actually "irrelevant to the neogrammarian hypothesis, as it is not an example of sound change at all, but rather an instance of the generalization of rules". This of course does not mean that there are no morphologically conditioned sound changes, but only that we may not talk easily of grammatically conditioned changes unless we have exhausted carefully all the possible phonetic conditioning factors. Thus, as King (1969:138) remarks, "we should act as if every phonological change were at most phonetically conditioned".

Granted the existence of nonphonetically conditioned sound changes, it is however remarkable that, to our knowledge, most of the examples provided in the literature are cases of inhibitory changes, exceptions to regular sound changes, such as prevention of homophony, or retention of categorial distinctions (gender, number, case, etc.). The reason for this may be: (a) that uncontrovertible instances of grammatical conditioning as causing primary change are hard to find; and (b) that more often than not people have carelessly invoked nonphonetic conditioning for phenomena they could not explain otherwise (the Iroquian example cited above would be a good case in point).

Below I present a number of cases of apparently genuine grammatically conditioned changes. If they are so, then here we have good instances of changes that contribute to the disconfirmation of the neogrammarian view of sound change in its strong version.<sup>4</sup>

1.1. Glottal Absorption. In a relatively recent study<sup>5</sup> I have presented in detailed fashion the evolution of *ʔ/q/* among the Waylla and Waycha lects

(called together henceforth Ya?a-Wanka, because here ya?a is the root for the first person pronoun), leaving aside the treatment of the same proto-phoneme in Shawsha-Wanka (called henceforth Nuha-Wanka, because here nuxa is used instead of ya?a), since its reflex /x/ is found regularly with some minor changes (cf. 2.1. below). The treatment of \*/q/ among the Ya?a-Wanka lects is interesting in a number of respects. Historically, the rule involved was:

$$(1) */q/ > \left\{ \begin{array}{l} \emptyset/\# \\ /?/ \end{array} \right. -$$

and the actual realization of /?/, according to the seven lects (ranging from A to G) which I have identified (see 2.1. below), is subject to certain phonological rules, each of which can be considered a further step in the change with respect to the former, showing us a clear case of a sound change in progress. The way this change propagates will be illustrated in the second section of this paper. For our present purposes we only need to introduce the treatment of the glottal stop in lect B, since A is the most conservative in that it preserves the output of rule (1) unchanged.

1.1.1. Geographic Distribution. This lect covers approximately the territories of the districts of Sapallanga (including the locality of Miluchaca) and Huayucachi (excepting the localities of Miraflores and Huamanmarca), both located at the southern border of the Mantaro valley, in the province of Huancayo.

1.1.2. Morphological Conditioning. In lect B it can be observed that the output of rule (1) is maintained in careful speech, B thus being in this sense similar to lect A. In colloquial speech however we have the following situation:

- (2) [átu] 'fox'  
 [yúla] 'white'  
 [ču?íu+ka] 'the corn'  
 [wa?lá+ña] 'it used to hook'

which in careful speech corresponds to (2a), respectively:

- (2a) [átu?]  
 [yúla?]  
 [ču?íú+ka?]  
 [wa?lá+ña?]

Thus, to give an account of this fact, we may formulate the following rule (leaving aside certain details which are irrelevant for our present discussion):

(3)  $/ʔ/ \rightarrow (\emptyset) / \text{---} \#$

(where the use of parentheses indicate the stylistically controlled nature of the rule). However, in view of (4) it will be seen that rule (3) is inadequate:

- (4) [atú+mi]            '(it is) fox'  
       [yulā+kā+mi]       '(it is) the white (one)'  
       [čũ?lũ+kĩ+waŋ]    'with the corn'  
       [wa?la+nā+čũŋ]    'did it use to hook?'

These forms correspond to the careful-speech forms of (4a):

- (4a) [atú+mi]  
       [yula?+ká?+mi]  
       [čũ?lũ+ka?+waŋ]  
       [wa?la+nā+čũŋ]

Comparing (2) with (4) we see that the loss of the glottal stop in (4) leaves as a reflex the lengthening of the preceding vowel, and therefore if we do not want to miss the generalization involved, we would like to set up an intermediate stage for (2) whereby before the total loss of the glottal a vowel lengthening takes place, and only then the long vowel becomes shortened by means of another rule, independently needed in the phonology of Wanka. Thus, the modified version of rule (3) would be:

(5)  $/Vʔ/ \rightarrow (\bar{v}) / \text{---} \left\{ \begin{array}{l} \#(\#) \\ + \end{array} \right\}$

This rule will then give us an intermediate stage for (2), which we offer as (6):

- (6) [átũ]  
       [yúlā]  
       [čũ?lũ+kā]  
       [wa?lá+nā]

and to arrive at (2) we need another rule, which shall be referred as Vowel Shortening rule:

(7)  $\bar{v} \rightarrow v / \text{---} \#\#$

Note that this rule is obligatory once rule (5) has applied; otherwise (6) would constitute an incorrect output, or an ambiguous output at best.<sup>6</sup>

1.1.3. As can be seen in the last two forms of (2), that is [čuʔlú+ka] and [waʔlá+ña], glottal stops that appear within roots are left unchanged even in fast speech. We must ask then what is so special in a root that leaves the glottal stop preserved? The answer surely cannot be reached by way of phonetic conditioning. Note that the roots in question are inherited from Proto-Quechua, thus the possibility of being borrowings that came into the language after the completion of the vowel lengthening rule must be discarded. Note also that the data presented constitute evidence for a change in its very beginning, since in the following lect -- that is C -- rule (5) is no longer a variable one, and its application is completely obligatory; in other words, rule (5) has become categorical. Moreover, in lect C we find new cases of glottal elision, this time affecting the roots themselves, again in the form of a variable rule. This being so, we can be sure that the change stated in (5) is morphologically conditioned in its beginning. The most important thing is that this change appears as a variable rule, showing us an innovation in its embryonic stage, in this sense, the possibility of a prior phonetic motivation has no grounds at all. From these facts it seems clear that here we have a genuine morphologically conditioned change, since to state the rule we have to make use of morphological information.

1.2. The elision of /k/. In Wanka, the phoneme /k/ drops in the following suffixes: (a) -ykā 'durative', (b) -kaʔ 'determiner', (c) -Kta 'accusative', (d) -nčik 'first person plural (inclusive)', and (e) -yki 'second person allocator'. Whereas the first two changes appear to be widespread and among different lects, the last three are limited to very restricted areas. In the following, I shall present the first two cases separately, and then the remaining three will be treated together, since they are found in rather small spots.

1.2.1. The durative -ykā. This modal is distributed among Wanka lects in two forms: -ykā and -yā. Historically, they go back to a pre-Quechua I \*-ykā,<sup>7</sup> and the vowel was shortened -- as it is today -- in a checked syllable. Since most suffixes in Quechua are of the pattern -C(V), it is evident that originally this suffix was bimorphemic, \*-y being identifiable as the infinitive marker, and \*-ka as the verb 'to be'. The way they become univerbated and lost their original meaning is not our concern here; we only

need to point out that in the synchronic grammar of Wanka, as well as in other Quechua lects, -ykā indicates a continuous action either in the past, present or future. In the remaining section I assume, without further comment that the underlying form of this morpheme in Wanka is -ykā.

1.2.1.1. Geographic Distribution. Among the different lects of Wanka, the innovated form covers the vast majority of territory. In fact, the -ykā area forms a more or less elongated island surrounded by the territory of -yā. The island forms, so to speak, a bridge between the three major Wanka lects. Thus, going from South to North, -ykā is preserved in the communolects of Sicaya (Waylla-Wanka), Orcotuna, Vixo, Huancaní, and probably Mito and Sincos (Waycha-Wanka)<sup>8</sup>; then the isogloss continues to the left side of the Mantaro River, beginning in the communolect of Huamali to the North, up to the Yanamarca Valley, and to the East covering the whole Masma Valley (Shawsha-Wanka). The remaining area is entirely "yaísta" (that is, showing -yā), except a small relic area on the mountains in the southwestern side of Huancayo, the communolect of Carhuacallanga, where -ykā is preserved, thus being a "kaísta" area. This is, roughly, the geographic distribution of the two variants of the durative.

1.2.1.2. Morphological Conditioning. From the data I shall present below it seems clear that the change that affects -ykā is not due to phonologically conditioned factors. Thus, the only way to formulate a rule that would account for the different realization of the durative among the two isolects we have delimited would be by writing a morphologically conditioned rule. To convince ourselves of this, let us consider the following roots, which are perfectly native words:

(8) [wáyka-]	'to assault'
[čáyku-]	'to catch'
[yáyku- ~ yáyka-]	'to enter'
[áyka]	'how much/many'
[tayká+či-]	'to make someone to sit'

We cannot say that /k/ drops only preceded by the semiconsonant /y/, because the sequence -yk- is regularly maintained in the roots of (8). Furthermore, the augmentative modal -yku ~ -yka (where the latter variant appears when followed by certain suffixes), which as we see has almost an identical phonetic shape as the durative, preserves its /k/ in a very

straightforward fashion.<sup>9</sup> Thus, compare (9) with (10):

- (9) -yku ~ -yka 'augmentative'  
 [likatyká+ma+ŋ] 'he/she suddenly saw me'  
 [liká+yku+l] 'by seeing'  
 [hunta+yka+?+mú+n+nā] '(it) suddenly became filled up'
- (10) -ykā ~ -yā 'durative'  
 [likatyká+ma+ŋ] ~ [likatyā+ma+n] 'he/she is seeing me'  
 [liká+yka+l] ~ [liká+ya+l] 'being watching'  
 [hunta+yká+mú+n+nā] ~ [hunta+yā+mú+n+nā] '(it) is becoming filled up already'

If it is the case that /k/ does not always drop after /y/, then it is less probable that it can drop after another non-vocalic segment, as the following situation illustrates. Thus, /k/ is regularly maintained in the durative-simultative -čka, as well as in the dynamic -lku ~ -lka, as the examples of (11) and (12) show respectively:

- (11) [lula+čká+ŋki] 'you will be doing while...'  
 [upy+čká+ŋki] 'you will be drinking while...'  
 [awsa+čká+ša?] 'I'll be playing while...'
- (12) [taká+lku+l] 'beating'  
 [muyú+lku+l] 'turning'  
 [taki+lku+pti+ŋ] 'once he/she sings'  
 [apa+ka+lka+pú+la+y] 'please take (it) for him/her'

Thus, we have seen that it is impossible to determine an exact phonological environment where /k/ drops. This being so, the only way to write the rule involved would be by assigning to it morphological information, by using the feature [+Durative], as in (13):

- (13) /y/ → Ø / [            
                                   +Durative]

It follows then that a rule along these terms is part of the phonological component of the yaísta lect; among the kaísta communolects, on the other hand, we assume that the rule is simply absent. This means that these latter communolects have the allomorph that is close to the underlying form.

1.2.1.3. Phonetic Realizations. Whereas we have not much to say about the phonetic realization of -yā among the yaísta lects -- it is uniquely pronounced either as [yā] or [ya], according to the environment

we have mentioned in 1.2.1.<sup>10</sup>, the way -ykā is actualized in the kaísta lects however is interesting to note. We shall have a look at these phonetic variations.

Aside from the very general rule of yod elision, by which /y/ in syllable-final position and preceded by the vowel i is assimilated to it causing the lengthening of the vowel (thus, likān from /li+ykā+n/ 'he/she is going'), the most notorious change affecting -ykā is the palatalization of /k/. This is true for almost all of the kaísta area, excepting the Masma Valley and some sporadic points within the Yanamarca Valley. In these latter it is possible that the rule of palatalization involved is a variable one, its application being determined by the style of speech used (casual speech favouring the innovated form). At this point we may ask: Is the process of palatalization affecting /k/ a general process or a particular one that operates only on the durative morpheme?

To answer the above question, let us first consider the case of the communiolect of Sicaya. In this locality, we observe the following realizations of the durative: (a) -ykā, (b) -yk<sup>y</sup>ā, (c) -yt<sup>y</sup>ā, and (d) -yčā. Although the exact distribution of these variants among the speakers (taking into consideration age and style variables only) is far from clear, we can safely say that they show a successive degree of palatalization. To be more precise, the process involved is of the progressive type and it does not operate when /k/ is in final syllable (thus [lit<sup>y</sup>úptik] from /li+ku+pti+k/ 'if you go', [mit<sup>y</sup>únčik] from /miku+nčik/ 'we (incl.) eat', [tíkti] 'wart', etc.). Thus in Sicaya this process not only affects -ykā; it is rather a general rule that applies across the board, whenever its structural description is met: after /i, y/; for some speakers even when /n/ is mediating. An illustration of the latter case would be [wasi+ŋ+k<sup>y</sup>úna] ~ [wasi+n+t<sup>y</sup>úna] ~ [wasi+n+čúna] 'his/her houses'.

Now let us consider other cases. As I have stated earlier, the Yanamarca Valley also shows palatalization of -ykā. However, here I have found only what appears to be the first degree of palatalization, namely -yk<sup>y</sup>ā; furthermore, this process only affects this and only this suffix. The same thing seems to happen in the communiolect of Orcotuna (Waycha-Wanka). The present and other similar facts<sup>11</sup> suggest that within

the kaísta territory, if the change continues, it will finally end up in a true palatal, namely -yčā, as in Sicaya and other areas of Quechua I. Thus, again, note that in Yanamarca and Orcotuna the palatalization of /k/ seems to be morphologically conditioned, since it affects the durative -ykā only. In view of this situation, it wouldn't be too daring to say that in Sicaya the palatalization process began by idiosyncratically affecting the durative morpheme and that it was only secondarily generalized to other environments.

Another change that must be noted is that in one place, Acolla (located in the Yanamarca Valley), I have found the variant -y<sup>v</sup>ā side by side with -ykā, the former being used in careless speech. This, I think, is a nice illustration of the way /k/ may have disappeared among the yaísta communiolects. Furthermore, Torero (1964:470A) also found the same intermediate stage in some localities of Cajatambo (Lima) and Yanacocha (Pasco). Thus I postulate that the intermediate step of the change /k/ → ∅ was the yodization of the velar phoneme.

Finally, to end this section we shall note that, as has been suggested in the preceding lines, the drop of /k/ is observed not only in Wanka but also among other varieties. Of special interest is the fact that the variety of Tarma and also that of Yauli, on the northern border of Wanka, form an entirely yaísta area (cf. note 8). Thus it appears that the kaísta zone of Wanka can be considered a relic area with respect to the preservation of /k/ in the durative. Note furthermore that wherever the velar drops we are in face of the same constraint: it occurs only in the durative, and sometimes in the augmentative also.

1.2.2. The determiner -ka?. Among the Quechua lects, Wanka is the only one that has a determiner suffix. Its origin is clear, since it was a by-product of the univerbation of \*ka- 'to be', nominalized by the agentive -? (which goes, as any glottal stop in Ya?a-Wanka, back to an original \*-/q/), in periphrastic constructions like: \*waĩpa ka+q+ta+m aši+yka+n 'he/she is looking for the (thing) that is chicken'. Synchronically it functions as a determiner, thus waĩpa means simply 'chicken', whereas waĩpa+ka? means 'the chicken' (already known by the listener). Although its function as a determiner is beyond doubt, its syntax is far from clear. Here I shall postulate -ka? as the underlying form of the determiner among



the Yaʔa-Wanka lects; for Ñuha-Wanka, on the other hand, -kax must be assumed as the basic form (since here  $\text{*/q/} > \text{/x/}$ ). This section will be entirely devoted to the phonetic realization of the determiner among the Yaʔa-Wanka communotects, since the latter form, that is -kax, shows no elision whatsoever of its  $\text{/k/}$ .

1.2.2.1. Geographic Distribution. As in the case of -ykā, here also we have a rather conservative area where  $\text{/k/}$  never drops. This is a tiny area that covers approximately the localities of Sicaya (Waylla-Wanka), Orcotuna, Vixo, Mito, Sincos and Huancañi (Waycha-Wanka), this latter on the borderline with Ñuha-Wanka. The only change that affects -kaʔ is the loss of  $\text{/ʔ/}$ , as it should be recalled from our discussion in 1.1. Thus, the loss of the glottal phoneme in syllable-final position leads to compensatory vowel length (and, furthermore, the long vowel is shortened before pause). This can be seen in the following examples:

- (14) [aʃnu+kā+ta] 'to the donkey'  
 [yawar+kā+wan] 'with the blood'  
 [walāš+ka] 'the boy'

which come from underlying forms such as those of (14a):

- (14a) /aʃnu+kaʔ+ta/  
 /yawar+kaʔ+wan/  
 /walaš+kaʔ/

and, as we already know, in Sicaya we may also expect forms such as [walmi+k<sup>yā</sup>+ta] ~ [walmi+t<sup>yā</sup>+ta] ~ [walmi+čā+ta] 'to the woman', since palatalization applies across the board. The underlying form of this expression is of course /walmi+kaʔ+ta/.

As in the case of -ykā, there is also another relic area, and this is again the communotect of Carhuacallanga. Here -kaʔ is preserved even more intact, because  $\text{/ʔ/}$  is also maintained and palatalization is absent. Thus the form observed in this area is close to the underlying representation we posited for the determiner.

Comparing the treatment of -ykā and -kaʔ among the conservative communotects we note that if a lect preserves -ykā, then it is likely for the same lect to preserve also -kaʔ; the reverse situation is not true, because -kax is regularly maintained in Ñuha-Wanka, and yet we know that in this area there exists geographic alternation between -ykā and -yā.<sup>12</sup>

1.2.2.2. Realization of -ka?. With the exception of the two relic areas mentioned above, in the remaining territory of Ya'a-Wanka the velar phoneme of the determiner drops, although this time depending on the environment. I offer below its various phonetic realizations.

- (15) [wamlá+mi] 'the girl (is)'  
 [wasí+man] 'toward the house'  
 [yakú+wan] 'with the water'  
 [wamlá+ka] 'the girl'  
 [walás+ka] 'the boy'  
 [walaś+ká+mi] 'the boy (is)'

If we were confined to use this and similar data it surely wouldn't be too hard to arrive at a basic form -ka? (especially after having introduced the glottal elision rule). There is, however, an easier way of getting at the latent form, and this is of course by looking at the conservative lects. Thus the problematic first three items of (15) are nicely solved by looking, for example, at data from Orcotuna:

- (15a) [wamla+ká+mi]  
 [wasi+ká+man]  
 [yaku+ká+wan]

and if we compare (15-15a) with the respective forms attested in Carhuacallanga, we would be able to recover the glottal stop, otherwise realized as vowel lengthening or as Ø.

From (15) we note that: (a) /k/ drops when the stem to which the determiner is added ends in a vowel, and (b) this is true only when -ka? is not a closing morpheme. Otherwise /k/ is preserved. This is a categorical rule, and a variable one only in communotects that remain in the neighbourhood of localities which preserve -ka?. This is clearly a transitional situation. Thus, in Aco and San Jerónimo (Waycha-Wanka) I have found forms such as [wamla+ká+ta ayá+mu+y] 'go call the girl', [wamla+ká+wan lí+y] 'go with the girl', together with [wamlá+ta ayá+mu+y] and [wamlá+wan lí+y], respectively.

Turning now to (15), we must say that in order to derive it we have to postulate an intermediate stage like (15b):

- (15b) [wamla+á+mi]  
 [wasi+á+man]  
 [yaku+á+wan]

[wamlá+kā]

[walaš+kā]

(assuming that the vowel lengthening rule has operated already). Thus, from these forms we arrive at (15) in the following way. To the first three items of (15b) we must apply a vowel contraction rule (needed independently in the phonology of Ya'a-Wanka) whereby the vowel of the determiner is eliminated in favor of the stem vowel; to the remaining two items, on the other hand, we apply rule (7), that is, the vowel shortening process. Furthermore, it should be noted that the vowel contraction took place first among homogeneous vowels, and only then among heterogeneous ones. I have found communiolects where only the first step was accomplished. Thus, to give an example, in the locality of Ingenio (Waycha-Wanka) I observed forms such as [walmi+á+ta ayá+mu+y] 'go call the woman', [čuku+á+ta apá+mu+y] 'bring the hat', etc. The same is true in Chalhuan (locality of Sincos, Waycha-Wanka). Incidentally, note that the vowel contraction rule is conspirative in nature, since in Quechua in general sequences of vowels are prohibited.

1.2.2.2.2. What seems to be a second step in the drop of /k/ is illustrated in the following set of items:

- (16) [walaš+á+mi] 'the boy (is)'  
 [ulpay+á+waŋ] 'with the dove'  
 [walaš+ka] 'the boy'  
 [ulpáy+ka] 'the dove'

As we see, /k/ drops even when the stem to which the determinant is added ends in a consonant. Clearly we are in face of a rule generalization. This second stage, however, is governed by a variable rule, its application being determined depending on the style of speech used. As usually, casual speech tends to favor elision of /k/; in careful style however the full form is automatically recovered.

1.2.2.2.3. Still a further step in the elision of /k/ is shown in the following data:

- (17) [wámlā ša+la+mú+ña] 'the girl had come'  
 [waláš+ā ša+la+mu+ña] 'the boy had come'

(which come from underlying /wamla+ka? ša+la+mu+ña?/ and /walaš+ka? ša+la+mu+ña?/, respectively where we see that /k/ drops also when -ka? is a closure morpheme. Again, this is a further step in the propagation

of the change. The generalization here involved is also a variable rule, and furthermore it coexists with the situation described in the preceding paragraph. This is to say that the third stage in the rule propagation does not presuppose the completion of the second stage. In other words, whereas the second step presupposes the completion of the first one, the third stage does not imply that the second is already accomplished. In short, we can say that  $2 \Rightarrow 1$ , but not that  $3 \Rightarrow 2$ .

To conclude this section, a word must be said with respect to the sonorization of /k/ whenever it is preserved. Thus, there exists in Wanka a voicing rule (see 1.4. below) whereby /k/ becomes voiced, its status being that of a variable rule, depending again on the style of speech used. Voicing, however, is not restricted to the velar stop of -ka?, as in certain communiolects palatalization is limited to -ykā; rather, it applies across the board among the suffixes. This being so, it is natural to expect that where voicing exists the allomorph -kā is actualized as -gā.

1.2.2.3. Morphological Conditioning. As in the case of -ykā, /k/ never drops in roots and in suffixes other than the determiner. Thus, by looking at the data given in 1.2.1.2. plus the items provided in (18), which are all forms inherited from Proto-Quechua:

- (18) [pāka-] 'to hide'  
 [pūka-] 'to blow'  
 [āka-] 'to wait'  
 [wāska] 'rope'

and also in (19):

- (19) [lumi+kūna] 'stones' (-kuna 'plural')  
 [plāsa+kāma] 'up to (the) plaza' (-kama 'allative')  
 [hatu<sub>u</sub>+kāska] 'greater than' (-kaska 'comparative')

we see that /k/ is intact, except that it becomes voiced where the rule of voicing is present. Incidentally, I must note that voicing only would affect the items of (19), not those of (18). Still, to give a more compelling example of how /k/ elision only affects -ka?, consider the following forms:

- (20) [hampi+kú+?+mi] 'the healer (is)'  
 [alkā+?+naw] 'as it were waiting'  
 [mukā+?+naw] 'as it were smoking'

(from Huacrapuquio) where the velar stop is maintained regularly. Thus, any attempt in trying to determine a phonetic environment in which /k/ drops would immediately fail. Here, as in the case of the durative, we have to recognize that the only way to write the rule is by providing its structural description with a grammatical information. However, here ends the parallelism we have been establishing between -ykā and -ka?, for in the former case we have no evidence whatsoever as to where and under what conditions the velar phoneme dropped; in the latter, on the other hand, we have good illustrations of the fact that /k/ began to drop intervocalically, provided the determiner was not a closure morpheme. Thus the data so far presented show us that /k/ began to be affected after a vowel ending stem, and then we can also note its gradual propagation to other positions. But even if we know that the original environment was postvocalic, we cannot avoid the conclusion that the change ultimately affected idiosyncratically the determiner suffix only. For these reasons we must conclude that also here we are dealing with a genuine morphologically conditioned phonological change.<sup>13</sup>

1.2.3. Elision of /k/ in other suffixes. Aside from the drop of /k/ in the durative and the determiner, it also drops in the accusative -Kta, in the first person plural (inclusive) marker -ñcik, and in the second person allocator -yki. Below I shall consider briefly each of these cases.

1.2.3.1. The accusative -Kta. The accusative marker is realized in Ya?a-Wanka as -kta when the stem to which it is attached ends in a short vowel, and as -ta otherwise (including after long vowels). This synchronic rule is however an historical one among all the rest of the varieties of Quechua, including the Ñuha-Wanka lect. Thus, the Ya?a-Wanka variety is the only Quechua lect that preserves -kta in its underlying form. However, among the northeastern communolects of Waylla-Wanka the allomorph -kta has been leveled to -ta, its alternation with -kta thereby disappearing. These communolects are Santo Domingo de Acobamba, Andamarca, Comas, and Cochabamba, all of them in the neighbourhood of Ñuha-Wanka, which only has -ta. Thus the easiest explanation for the elimination of -kta would be to say that it is due to influence from that lect; furthermore, this hypothesis is reinforced by the fact that in another communolect, Chalhuan

(Waycha-Wanka), located on the western border with Ñuha-Wanka, I have found only -ta. However, even without recourse to extrasystematic explanations, we can safely say that the change -kta → -ta is due to the universal principle of minimization of allomorphic alternation. But even if we say that the loss of /k/ in the accusative variant -kta is due to restructuring, we have to admit that originally this change was also morphologically conditioned in all of the Quechua lects, since, as far as I know, there never was a rule that otherwise affected the sequence -kt-. Synchronically, the fact that this sequence remains unaffected is illustrated in the following set of native roots:

(21) [lákta] 'thick'

[túktu-] 'to be asquat'

[tíkti] 'wart', etc.

1.2.3.2. The plural marker -ñik. In the same localities where we have leveling of -kta → -ta, I found that the velar phoneme of the first person plural (inclusive) marker also drops. The rule is a categorical one, except in one communiolect -- Comas (Waylla-Wanka) -- where it is found only in careless speech. Furthermore, the same change was also noticed in Roncha (locality of San José de Quero, Waylla-Wanka), on the western side of Waylla-Wanka. Again, it cannot be said that /k/ regularly drops in final position, since forms such as:

(22) [čúsik] 'a variety of owl'

[li+kúpti+k] 'if you go'

-- not to speak of final /k/ preceded by a vowel other than i -- show that the velar phoneme is maintained intact. It can be argued perhaps that in the latter form /k/ is a morpheme that marks second person, that being the reason why the velar does not drop, but what about the first item? Here /k/ does not mean anything, nevertheless it is preserved. Once more, we are here confronted with a morphologically conditioned change.<sup>14</sup>

1.2.2.3. The second person allocator -yki. Among the northernmost communiolects of Shawsha-Wanka (in Ricrán, for example) I have noticed a change that consists in the syncope of the syllable ki of -yki, perhaps through an intermediate step -yki → -yi → -y. Thus, accordingly, we have: [čaklá+y+ta] from /čakla-yki+ta/ 'your (acc.) farm', [mísá+y+man] from /mísatyki+man/ 'on your table', etc. The conditions under which this

change operates need to be investigated further, but what is beyond doubt is that the change affects that suffix only, similar sequences being conspicuously maintained. Furthermore, this change seems to be more general (categorical) in the neighbouring lect of Tarma. Thus, here we have forms such as: [qam+qatta yali+ša+y+m̩], [pāga+ša+y ali+ta+m] from /qam+qatta yali+ša+yki+m/ 'I'm going to win you', /pāga+ša+yki ali+ta+m/ 'I'm going to pay you a lot', respectively.

1.3. Velar Vcicing. Except for borrowings from Spanish, Quechua in general does not have voiced stops, although some lects -- especially those of Quechua II -- have developed them as a result of phonological changes not only as voiced allophones, but also as underlyingly distinctively voiced phonemes.<sup>15</sup> In the Wanka lects I have found a variable rule affecting the velar /k/, but, as we shall see, the rule operates in derived forms only, whereas the roots remain unchanged.

1.3.1. Geographic distribution. The voicing rule is observed in the Yaʔa-Wanka lects, thus covering part of the provinces of Huancayo and Concepción. From South to North, the change begins in the communolects of Cocharcas (district of Sapallanga) and Huamanmarca (district of Huayucachi); it continues covering the left side of the Mantaro River up to the district of Cajas Chico (Huancayo). From here the isogloss, on the one hand crosses the river, reaches the communolect of Huamancaca Chico, and extends through the districts of Chupaca, Pilcomayo and Ahuac, excluding the districts of Sicaya, Orcotuna (including Vixó), Mito, Sincos and Huancaní, up to the border with Shawsha-Wanka; on the other hand, it continues covering the remaining districts of Huancayo and Concepción up to the border with Shawsha-Wanka. In this way the voicing area forms two islands of unvoicing territories, one at the southwestern side of the Valley, and the other at the banks of the river, in the northern territory of Yaʔa-Wanka, both islands on the right side of the river.

1.3.2. Morphological Conditioning. To see how this rule operates, let us consider the following data:

- |                              |                                |
|------------------------------|--------------------------------|
| (23) [waɪpá+ga wañú+gu+ŋ]    | 'the chicken died'             |
| [aŋka+guná+ga pālí+gu+ŋ]     | 'the buzzards flew'            |
| [čupaka+gáma li+ku+yá+lg+ŋ]  | 'they are going up to Chupaca' |
| [taki+lgú+li mi mika+págu+ŋ] | 'they use to eat singing'      |

which in careful speech is realized as (23a):

- (23a) [waĩpá+ka wañú+ku+ŋ]  
[aŋka+kuná+ka pālí+ku+ŋ]  
[čupaka+káma li+ku+yá+lka+ŋ]  
[taki+lku+l+mi mika+páku+ŋ]

As we can see, in (23) only the suffixes are affected by the rule; the roots, on the other hand, are left unchanged.<sup>16</sup> Notice that here, as in the other cases, the roots are patrimonially inherited from Proto-Quechua. Thus, again, there is no way of formulating this rule unless we make use of categorial information; this can be done as follows:

- (24) /k/ → (g) / [                      
+ suffix]

where the parenthesis notation indicates that this rule is conditioned by the style of speech used. As usual, fast speech tends to favor the change. Incidentally, we should note that this change is almost categorical in certain communiolects and for certain speakers (this was noted especially in Huarivilca and in Cochabamba). This is so, because in these areas the speakers were aware that they pronounce g where others have k, thus laughing at those who use the latter sound; this is not true for the speakers who manifestly make variable use of the rule, since they accept both pronunciations while still considering the "older way" better. From the data we have at hand it is difficult to infer what was the primary conditioning factor for voicing (even in that restricted environment); it may be the case that the rule started intervocalically and then spread to after voiced consonants, and so on; a careful study may perhaps detect this possibility. Whatever the inception might have been, there is no doubt that the change affects suffixes only; as such, this is another example showing that there are morphologically conditioned changes.

1.4. Depalatalization of /ñ/. According to Parker (1971:66-70), the depalatalization of /ñ/ is a general change that covers almost the entire territory of Quechua I, except the lect of Baños Rundos and the peripheral lects of Corongo (to the North) and Wanka (to the South). In this latter lect however I have found the same rule, but this time affecting only the two suffixes which contain that phoneme: -ñā? 'narrative past', and -nā 'inceptive'.



1.4.1. Geographic Distribution. The area where the two mentioned suffixes appear depalatalized covers the territory of Waycha-Wanka, and also the northeastern side of Waylla-Wanka, up to the border with Shawsha-Wanka. Aside from these areas, I have also found depalatalization of /ñ/ -- this time not only restricted to the suffixes -- among the northernmost villages of the district of Ricrán (Shawsha-Wanka). This latter situation can perhaps be attributed to influence from the neighbouring lect of Tarma which shows the rule in its generalized version; for this reason I will ignore this latter area, and deal with the former areas only. I assume that here the underlying forms of the suffixes are -ña? and -ña, in view of the interlectal alternation.

1.4.2. Grammatical Conditioning. That the rule of depalatalization affects only the suffixes and not the roots can be seen in the following examples:

- |                          |                                 |
|--------------------------|---------------------------------|
| (25) [kaña+yá+na]        | 'he/she was burning (it)'       |
| [maña+mú+na]             | 'he/she had asked for (it)'     |
| [wayta+yā+nā+na]         | 'it was flourishing already'    |
| [chuñu+naku+ya+lka+ŋ+na] | 'they are congregating already' |

Contrast this situation to that of Huacrapuquio, for example, where we have the fully preserved forms:

- (25a) [kaña+yā+ña?]  
 [maña+mú+ña?]  
 [wayta+yā+nā?+ña]  
 [chuñu+naku+ya+lka+ŋ+ña]

Thus, it is clear that in (25) we have another example of a nonphonetically conditioned sound change, since there seems to be nothing special among the roots that can prevent a rule from taking place. Therefore, in order to formulate the rule involved we are forced, again, to make use of grammatical information. Thus we can formulate the rule of depalatalization as follows:

- (26) /ñ/ → n /  $\left[ \frac{\text{suffix}}{+ \text{suffix}} \right]$

It should be noted that whereas this rule is categorical for the narrative past, it is not so for the inceptive, since I have found communiolects where -ña alternates with -na (for example in Ingenio and Andamarca). The implication of this is that perhaps the depalatalization of -ña? is

earlier than that of -ña. This is further confirmed by the fact that among the localities of Masma and Molinos (Shawsha-Wanka) the realization of the narrative past is -nax, whereas the inceptive remains as -ña.

Furthermore, an interesting situation that shows the different treatment of /ñ/ within suffixes and within roots is the following. In San Jerónimo I have noticed expressions such as: [nã+mi li+kuyã+na] from /ñã+mi li+kuykã+ñã/ 'he/she was leaving already', where ñã as an adverb (historically related to the suffix) maintains the palatal nasal, whereas the suffix shows the change. In the second section of this paper I will have occasion of returning to this point; for the moment it may suffice to say that again we are confronted with a grammatically conditioned sound change.

1.5. The Monophthongization of /aw/. In Wanka, as in other Quechua I lects, there are two suffixes which contain this sequence: the locative -caw, and the comparative -naw. These forms are monophthongized as -cû and -nû, respectively. (Among the Ñuha-Wanka communolects the second suffix does not exist; here -naŝ is the equivalent (related?) morpheme). The monophthongization of /aw/ is also found in the Ancash variety of Quechua I, where it not only affects the suffixes mentioned, but the entire lexicon. Parker (1971:78-82) gives the exact distribution of this change which he considers functionally related to the monophthongization of /ay/ → ē, and /uy/, /iy/ → ī. In this area /aw/ is monophthongized as ō.

1.5.1. Geographic Distribution. In general, the diphthongal form of the suffixes is found in all three Wanka lects. Thus in Waylla-Wanka we find it in the most conservative areas, namely Huacrapuquio and Carhuacallanga, both located at the extreme southern border of the province of Huancayo. We also find another Waylla communolect, bordering the Waycha variety, and this is Sicaya, where however only sporadically I hear the locative as -caw, although -naw is the only realization of the comparative. Fluctuating areas contiguous to Huacrapuquio and Sicaya have been located, and these are Viques and Vixo, respectively. Here I found variably -cō and -nō in nonfinal position, and -cō and -no word finally (recall the vowel shortening rule stated in 1.1.2.). In Waycha-Wanka I have found -caw and -naw only among the communolects of the right side of the river, beginning in Orcotuna and ending in Huancani, at the border with

Ñuha-Wanka. In this latter lect -- since -naw does not exist -- we find -ĉaw again only among the communolects of the left side of the Mantaro River, up to the district of Paccha. Elsewhere, we find -ĉũ ~ -ĉu and -nũ ~ -nu, that is the monophthongized forms. Here I shall assume that the underlying forms of the suffixes are -ĉaw and -naw, respectively.

1.5.2. Morphological Conditioning. To see how this change operates, affecting the suffixes only, let us consider the following examples:

- (27) [ĉawpí+ĉu] 'in the middle'  
 [ñawpa+ĉũ+mi] 'in advance, before'  
 [kawpũ+nu] 'like a spin'  
 [pinaw+nũ+mi] 'like a (variety of) herb'

As we can see, only the suffixes are affected. Thus clearly we have again a case of morphologically conditioned phonological change.<sup>17</sup> The only way to formulate the rule involved is by restricting its application to the locative and comparative morphemes. Thus, we would have something like (28):

- (28) /aw/ → ũ / [\_\_\_\_\_  
 + suffix]

1.5.3. Phonetic Realizations. As I have said in 1.5.1., there are transitional areas where we find -ĉō ~ -ĉo and -nō ~ -no. Thus obviously an intermediate step in the change is an assimilation of the vowel a to the following semiconsonant, that is -ĉɔw and -nɔw. A second stage is the monophthongization in ō. Now, since among the Wanka lects we do not have mid vowels (not even allophonically as it is the case in other varieties of Quechua that retain /q/, a lowering phoneme par excellence), the obvious solution -- as in the treatment of borrowings from Spanish<sup>18</sup> -- is to rise this derived orphan vowel, and thus we have the forms -ĉũ ~ -ĉu and -nũ ~ -nu. However, in certain communolects of Waylla-Wanka (such as Huayucachi, Chongos Bajo, Chacapampa, etc.) I found the variants -ĉuy and -nuy. How do we explain these latter forms? I believe that here the yod is an excrecent phoneme, for similar cases are not difficult to find elsewhere among the Wanka lects. Thus, we have variants such as ĉuyĩu alternating with ĉũĩu from /čuyĩu/ 'corn', buyĩu side by side with bũĩu from Spanish hollo 'a special type of sweet bread', etc. These variants with yod are less generalized, and in one and the same communolect we can

find both, the forms with *yod* and the monophthongized versions. Finally, as has been said elsewhere in this paper, the allomorphs with short vowel are the product of the application of the vowel shortening rule; thus we have here another independent motivation for this rule. In the second section, I shall return to this change briefly.

1.6. Nasal Absorption. In all Quechua varieties there is a suffix called directional, realized as -mu; this morpheme indicates the beginning of an action in a place other than where it is spoken of, and with verbs of motion it also indicates the direction towards the place of speaking. This suffix changes to -w among certain communolects of Waylla-Wanka by a variable rule, as we shall see.

1.6.1. Geographic Distribution. The change -mu → -w is found among the communolects of Sicaya and neighbouring communities, especially San Juan de Jarpa, in the Waylla lect. Aside from these areas, we find constantly -mu in the remaining territories of the Wanka lect. As far as I know, this change is unique, to be found only in Waylla-Wanka.<sup>19</sup>

1.6.2. Grammatical Conditioning. To see how this change operates affecting the directional -mu only, let us consider the following cases which correspond to the colloquial style, as observed in Sicaya:

- |                     |   |
|---------------------|---|
| (29) [ša+w+lā+nčik] | 'we (incl.) came'                         |
| [apa+kā+w+lā]       | 'I brought (it) here for me'              |
| [ašī+w+ša]          | 'I'll look for (it) there'                |
| [hulā+la+w]         | 'he/she removed (it) from there'          |
| [yalā+li+w]         | 'they got off from there'                 |
| [apa+ka+w+kí+maŋ]   | 'you should have brought (it) from there' |
| [talpu+ka+lā+w+čik] | 'we (incl.) have planted (it) over there' |

forms which in a more careful speech correspond to those listed in (29a):

- |                       |
|-----------------------|
| (29a) [ša+mu+lā+nčik] |
| [apa+ka+mú+lā]        |
| [ašī+mú+ša]           |
| [hulā+lā+mu+ŋ]        |
| [yalā+lí+mu+ŋ]        |
| [apa+ka+mu+ŋkí+maŋ]   |
| [talpu+ka+la+mú+nčik] |



variable rule; and especially in Sicaya it is turning into a categorical one. That the rule is grammatically conditioned is corroborated by the following items:

- (32) [amú+la] 'he/she used to have (it) in his/her mouth'  
 [hamu+yā+mā+ñal] 'he/she was blaming me'  
 [kumú+ɲya+ŋ] 'he/she starts to bow down'  
 [amu+čá+yā] 'I'm fertilizing (it)'  
 [l̥amu+m] '(it is) obtuse'

where the sequence mu(n) is never affected, not even in the most careless speech. Thus, the obvious conclusion is that here we have another case of genuine grammatically conditioned rule.

1.7. Glottal Metathesis. As we have seen in 1.1., the glottal stop is one of the reflexes of \*/q/ in Yaʔa-Wanka. Thus the reflexes of the Proto-Quechua suffixes \*-rqU 'simulative' and \*-šqa 'participle' are, respectively, -ʔlU and -ʔša, showing a clear case of leftward metathesis. However, as we shall see, the reflex of the simple past suffix \*-rqa is not \*-ʔla but -lʔa, that is without metathesis. Incidentally, these suffixes are historically bimorphemic, where \*-r and \*-š were aspect markers. Furthermore, the vowel of the simulative is realized normally as u, but as a if followed by certain suffixes (thus behaving in the same way as the augmentative -ykU (cf. 1.2.2.2.)).

1.7.1. Geographic Distribution. The metathesized suffixes and their derived forms are found only in Yaʔa-Wanka. In Nuha-Wanka, on the other hand, the reflexes of the mentioned suffixes are, respectively, -lU and -ša, showing no reflex whatsoever of the \*/q/, in spite of the fact that in this lect, as I stated earlier, the uvular stop regularly went to /x/. The explanation for this is that here the suffixes (including the simple past) were subject to a cluster simplification rule which is found elsewhere among the Quechua lects, either as an accomplished process or as a variable rule (see 2.4. below). To complicate matters, however, I have noticed also in Yaʔa-Wanka reflexes of the simplified form of the simulative; but since I do not have a detailed morphological information of this variety, it is difficult to get a clear understanding of the situation.

1.7.2. Grammatical Conditioning. As stated earlier, glottal metathesis affected the simulative and the participle suffixes only; the simple past,

as well as similar sequences within the roots, are left untouched. Thus, compare (33) with (34):

- (33) [miku?luŋ] 'he/she ate (it)'  
 [puŋu?lú?l?a] 'he/she slept (there) for a while'  
 [likali+?lā+li+mú+ŋki] 'you (all) appeared suddenly'
- (34) [puŋú+?ā] 'I slept'  
 [awsat+?ā+nki] 'you played'  
 [miku?l?a] 'he/she ate'

where we see that only the simulative was metathesized. Note particularly the second item of (33), where we find the simple past following the simulative. Thus, we may question, why is that metathesis applied only to the simulative and not to the simple past? The same question holds for the forms listed in (35):

- (35) [húl?u-] 'to remove'  
 [úl?u] 'hill'  
 [ál?u] 'dog'  
 [pil?a] 'wall'  
 [síŋ?a] 'nose'

where we see that the sequence C?, particularly l?, does not metathesize. Now, let us consider the items of (36):

- (36) [mančá+?ša] (ka+yka+n) 'he/she is scared'  
 [waŋú+?ša] (ka+yka+n) 'he/she is dead'  
 [pakí+?ša] (ka+yka+n) 'it is broken'

and compare them to the items of (37):

- (37) [píš?u] 'bird'  
 [púč?u] 'bitter'  
 [áč?a] 'rough'  
 [áy?i] 'to escape'

As can be seen, once more metathesis applies only to a particular category, and similar sequences occurring within roots are left unchanged. Thus, a formulation of the rule for both cases would have this form:

- (38) /C?/ > /?C/ /  $\left[ \begin{array}{l} \text{<+ Simulative>} \\ \text{<+ Participial>} \end{array} \right]$

To be true, however, I must say that in Waylla-Wanka I found the doublet mīlay from /mi?lāy/ 'lap' (noted in Sicaya), and mīlay from

/mĩʔay/ elsewhere (cf. Huacrapuquio mĩʔay); this form goes back to Proto-Quechua \*mĩʔay. As we can see, the first alternant is a metathesized version. This is the only example I have found where metathesis applied to a root. Furthermore, the normal development from \*riqsi- 'to know, reckon' would have been in Yaʔa-Wanka \*lĩsi- (or \*liʔsi- among the communolects which preserve the glottal stop, as one finds lixsi- in most Ñuha-Wanka varieties); however, what we find elsewhere in Yaʔa-Wanka is lisi- from /lisʔi-/ (cf. Huacrapuquio lisʔi-, and also lixsi- in the communolect of Paccha, Jauja). These two cases then seem to reduce the validity of this example as another case of grammatically conditioned sound change; however, in view of the overall evidence presented in this paper for morphologically conditioned primary changes being limited to suffixes, it is at least remarkable that the glottal metathesis is most widespread and systematic in certain suffixes.

2.0. A language particular universal. In the first section of this paper I have presented several cases of morphologically conditioned phonological changes. We have seen also that some of these are attributable not only to Wanka, but parallel changes taking place among different lects of both Quechua I and II can be detected. However, some of them are observed in Wanka only; this can be explained partially by the fact that the change takes place within a specific suffix that is lacking among other lects (e.g. the determiner -kaʔ), or else by the fact that the change affects a sound which is limited to this lect (e.g. the glottal stop). In any case, however, I have tried to demonstrate that it simply is impossible to detect a purely phonetic conditioning for these changes, the natural conclusion thus being that they are grammatically conditioned changes; that is, in order to formulate the rules involved in each case one has to state the domain of its application by providing a morphological information to its structural description. Moreover, it was shown that most of these rules are not morphologized versions of prior phonologically determined rules.

Now, in view of the facts we have observed I would like to formulate a working hypothesis according to which there is tendency in Quechua for a change to begin affecting suffixes only, and then to spread to roots. This fact is familiar to Quechuanists, who either implicitly or explicitly have



assumed morphologically conditioned changes.<sup>21</sup> Whatever the reason for that tendency may be remains a mystery; thus in this final section I will limit myself to illustrating this type of rule generalization by presenting vivid examples of sound change in progress. If I succeed in demonstrating not only the type of change we are dealing with but also its propagation from the suffixes to the entire lexicon, then Quechua would be a clear counterexample to Kiparsky's (1973) claim that no primary sound change can depend on morpheme boundaries. What is more important, the cases presented here would challenge Kiparsky's hypothesis according to which all phonological rules that depend on morpheme boundaries arise by generalization from non-derived to derived environments. The examples I will provide show that a rule can become generalized from derived to nonderived environments, thus falsifying Kiparsky's claim.

2.1. The generalization of glottal absorption. Below I offer a lectal matrix that shows the generalization of the rule of glottal absorption among the Yaʔa-Wanka lects, as presented in Cerrón-Palomino (1973:79). The interpretation of the matrix is as follows. The lects A-G and the rules (1) - (6) form an implicational pattern<sup>22</sup> in the following way:  $G \Rightarrow F \Rightarrow E \Rightarrow D \Rightarrow C \Rightarrow B \Rightarrow A$ ; that is, lect G has accomplished the processes that took place in F; this, in turn, has the changes observed in lect E, and so on, but not conversely; that is, lect F for example does not have yet rule (5), and lect E in turn does not have rule (4), whereas this change is categorical in F, etc.. This means, consequently, that rule (5) implies rule (4), and this in turn implies (3), and so on. In other words, each one of the lects except the following constitutes a recapitulation of the path followed by the immediately following process of change. Taking into account the temporal axis, this means that in the implicational pattern  $G \Rightarrow F \Rightarrow E \Rightarrow D \Rightarrow C \Rightarrow B \Rightarrow A$ , what is implied by the other is anterior to the latter. This means that the change (1) clearly was anterior to rule (2), this in turn preceded (3), and so on, until we research the most recent rule, that is (6). This can be formulated in the following way: (1) > (2) > (3) > (4) > (5) > (6), that is what is less than the other is posterior to the former.

R U L E S	L E C T S						
	A	B	C	D	E	F	G
(1) /V?/ → $\bar{v}$ / $\left\{ \begin{array}{c} - \\ + \end{array} \right. \#(\#) \}$	-	x	+	+	+	+	+
(2) /V?/ → $\bar{v}$ / — C	-	-	x	+	+	+	+
(3) /?/ → $\emptyset$ / C —	-	-	-	x	+	+	+
(4) /?/ → $\emptyset$ / $V_i$ — $V_j$	-	-	-	-	x	+	+
(5) /?/ → $\emptyset$ / $V_i$ — $V_i$	-	-	-	-	-	x	+
(6) /?/ → $\emptyset$ / $\left\{ \begin{array}{c} C \\ V \end{array} \right\} \#$ —	-	-	-	-	-	-	x

Viewing the matrix from bottom to top, we note that (6), being more recent, has a minor diffusion (actually this is a variable rule for lect G); rule (1), on the contrary, being the oldest, has a wider diffusion among the lects. Note that the changes begin as a variable rule (x), and only then they are categorical (+). Viewing from top to bottom, the matrix illustrates the fact that lect A is completely immune to the set of rules (i.e. is the most conservative lect), but B began to be affected by rule (1) (see our previous discussion in 1.1.1.), and C contains it as a categorical rule, and so on. That is why I said that B recapitulates a prior stage through which C passed already, and this lect in turn repeats the history of D, and so on. This being so, we can safely say that rule (1) represents the original change; from this, gradually, the rule attacked more environments thus becoming generalized. In this fashion, we can even predict the directionality of the change: thus we can say that through time lect A will incorporate the change which already reached lect B, and this in turn will accomplish the change observed in C, etc. Hypothetically, the change will reach its completion when all the pigeon-holes of the matrix contain only (+).

This is then an example of a rule generalization which in its very beginning applied only to derived environments, and only then proceeded to non-derived inputs. As we have seen, the change attacked the glottal stop before word boundary and propagated through the lexicon. It can

perhaps be argued that since word boundary coincides sometimes with actual pause, the change began originally in the prepaused (phonetic?) environment and subsequently propagated by rule generalization to other environments. The change therefore would not be a good example of genuine morphologically conditioned change. However, recall that the change takes place not only before actual pause but also in certain suffixes where such a pause simply does not exist. Therefore, a natural conclusion seems to be that the change in question is grammatically conditioned from its inception. Notice furthermore that a similar change is taking place in Nuha-Wanka, where a variable rule governs the loss of /x/ (counterpart of /ʔ/, both coming from \*/q/). Thus we have cases like [átux] 'fox', [yúlax] 'white' side by side with [sulxú+śa] from /sulxu+śax/ 'I'll remove (it)', but [sulxu+śa<sup>h</sup>+mi] 'I'll remove (it)'. We see in these examples that whereas /x/ drops in the suffix -śax 'first person future' (as well as in other suffixes that contain a final /x/), the same is not true not only for the lexical items atux and yulax, but also for the verb root sulxu- 'to remove' where the velar phoneme remains untouched; note also that the velar is changing into aspiration.

2.2. The depalatalization of /ñ/. As we have seen in 1.4., this change affects suffixes only. Of the two suffixes involved, we noted that the narrative -ña? is the most constant in the change, whereas the inceptive -ña sometimes alternates with the unchanged form. The rule is, however, a general one among the northern Quechua I lects, beginning from Tarma and Yauli (which borders Nuha-Wanka) up to the limits with the dialects of Quechua II. While in Nuha-Wanka, except for two spots (Masma and Molinos, where we find -nax) and the bordering villages of Ricrán, there are no traces of this change, in Waycha-Wanka however we find it. As there is no contact at all between this lect and the rest of the depalatalizing lects of QI, we must assume that the change is an independent drift. Parker (1971:66-70) studying this change among the QI area of Ancash (cf. his table 4) concludes that "everything seems to indicate that the change began in the environment of a morpheme boundary"; thus in his table 4 (p. 68) the two suffixes -ña and -ñaq show the most widespread change, whereas the generalization across the lexicon is gradually less diffused, and at least in one case (the word ñatin 'liver')

the rule is a variable one in the most innovating lect.

Thus, as in the former case, here again we see how a rule spreads leftward, from the suffixes to the roots, that is from derived to non-derived environments. In the Wanka case one may ask why the change seems to be, so to speak, fossilized in the two suffixes only. To this we may answer first of all that it is not true that the change is entirely frozen, since we noted that the inceptive is sometimes used in its unchanged form; secondly, of the three Wanka lects, the Waycha variety is disappearing (recall note 7) rapidly due to the increasing predominance of Spanish. These two facts, I think, explain perfectly the apparent stagnation of the change, and on the other hand do not invalidate my claim.

2.3. From the examples discussed in the two preceding sections, it wouldn't be too adventurous to say that the remaining cases studied are also examples of sound changes which began applying to suffixes, and secondarily began to affect the roots (an exception being the glottal metathesis rule which seems completely petrified). What is important to note is the fact that none of these instances show traces of a morphologization of phonological rules.

2.4. Aside from the depalatalization of / $\bar{n}$ / among the Quechua I lects of Ancash which Parker demonstrated to have begun "in the environment of a morpheme boundary", there are other changes that have the same type of restrictions. Thus Parker (1971:67-68) says: "That a change should begin in suffixes and then spread to roots is not surprising if we know that two other changes in Quechua are known to have the same constraint: (1)  $*uy > \bar{i}$  in parts of Ancash (...); and (2) final  $*p > x$  in Cuzco-Bolivian (...)"'. With respect to the first change he mentioned (p. 80) that it has "the peculiar constraint that it operates only when a morpheme boundary (or internal word boundary) is adjacent to //y//"; thus "it does not affect root-internal //uy//", as in /huytu/ 'oblong', /luycu/ 'deer', etc.

Furthermore, there is among different varieties of Quechua a cluster simplification process which operates in suffixes only. Thus Parker (1971:98) states: "In Quechua generally there is a tendency to simplify suffixes and combinations of the shape -CCV, almost always by dropping the second consonant". He then proceeds to list the following cases:

Bolivian -sa ~ -ša < \*-čka 'durative', Cuzco -yU < \*-ykU 'augmentative' (also observed in Tarma, cf. note 8), Ayacucho -ra ~ -rqa < \*-rqa 'past definite tense' (also observed in Wanka, cf. the discussion in 1.7.1.), and Junín -yā < \*-ykā 'durative' (a change we are familiar with). He also mentions the fact that in the commulect of Antonio Raymondi \*-rqa, \*-rqu, and \*-šqa (cf. with the situation in Ñuha-Wanka in 1.7.1.), all of them tense markers, "lose \*q regularly by a variable rule".

All these changes listed suggest that the tendency of sound change beginning in suffixes is perhaps a language-specific universal in all of Quechua lects.<sup>23</sup> As I have stated earlier, the reason why this is so needs to be carefully explored, and perhaps the explanation might have something to do with the agglutinative character of this language. Thus, an urgent task would be to look for similar types of changes among languages of the Quechua type. As Parker (1971:99) says, "changes of this type deserve greater attention than they have received to date".

#### FOOTNOTES

\* I am grateful to Professor Hans H. Hock for his criticisms and for suggesting to me many improvements, both in form and content, for this paper. His ideas will be apparent at many places in this paper, nevertheless it would be inaccurate to say that he agrees with everything I say. I should also thank Professor Charles W. Kisseberth for his helpful comments. All errors of fact and/or interpretation are my own.

<sup>1</sup> Since the term "dialect" is rather misleading, sometimes being defined in terms of extralinguistic criteria, the practitioners of the dynamic model (see note 2), especially Bailey and his followers, prefer to use more appropriate terms such as lect and islect. These concepts are definable by linguistic criteria alone. Thus, "a particular speech form, with respect to a particular linguistic innovation, is an islect in one of three possible ways: (1) it lacks the innovation; (2) it has the innovation as a variable rule; or (3) it has the innovation as a categorical rule". And "lect is a speech form so defined for all the innovations in the language or for some specific subset of them". Cf. Parker 1971:46-47. See also Bailey 1971a: I, 11-12 and Bailey 1973.

<sup>2</sup> A detailed characterization of each of these paradigms, as well as an evaluation of them, can be found in Bailey 1971b, also in Bailey 1971a: I, 37-39.

<sup>3</sup> For a justification of this point, as well as for the theoretical considerations concerning the naturalness of polylectal grammars, see Bailey 1972a.

<sup>4</sup>The cases I present are also demolishing counterexamples to the claim recently made by the adherents of the so-called "natural generative phonology", since they maintain that sound change is statable in purely phonetic terms. Cf. Hooper 1974.

<sup>5</sup>Cf. Cerrón-Palomino 1973.

<sup>6</sup>I should note incidentally that this rule does not apply to forms such as mamá 'my mother', wasí 'my house', awsá 'I play', mikū 'I eat', etc., since in these forms the vowel lengthening is marking the first person singular actor and allocator. Therefore, this morpheme (which we may represent as -v̄) has to be marked somehow as [- Rule (7)].

<sup>7</sup>Torero (1964:470A) reconstructs it as \*-yka, that is without vowel lengthening. His reason was perhaps the fact that vowel lengthening in some of Quechua I lects is a by-product of more recent changes, especially as a result of the drop of certain consonants in syllable final position (cf. 1.1.2. above). However, evidence from Wanka suggests that the length of the vowel in the durative cannot be attributed to compensatory phenomena. Thus, there is no doubt that the long vowel is native to Proto-Quechua I; cf. Parker 1971.

<sup>8</sup>In these communities as well as in others (especially on the left side of the Mantaro River) Wanka is in the process of disappearing, even old informants being difficult to find; some of these do recall rather vaguely a few words. However, since those two communities are enclosed by -ykā preserving lects, we can safely infer that their /k/ was not elided either.

<sup>9</sup>However, in the communiolect of Huacrapuquio (Waylla-Wanka), one of my informants (43 years at the time I elicited my data) told me that he used to listen to his mother and elder persons saying, for example, [míkú+yut̪] from /mikut̪ykut̪/ 'try to eat (it)', and also, more dramatically, [uyú+?lut̪] from /uykut̪?lut̪/ 'give (it) to him/her/it', [ayú+?lut̪] from /aykut̪?lut̪/ 'bring (it) in', etc. While this fact needs to be checked more carefully, we may perhaps explain the situation as follows. It is possible that the change /k/ → ∅ after /y/ was a more general rule in Huacrapuquio and only here, affecting not only the durative but also the augmentative and even certain roots. Subsequently, under the pressure of the surrounding dialects, Huacrapuquio undid the generalization at least root internally and in the augmentative suffix also.

The change -ykū → -yū 'augmentative' was also encountered in the communiolect of Canchayllo (Shawsha-Wanka). Thus, we have forms such as [samat̪yú+šun̪] from /samat̪yku+šun̪/ 'let us take a rest', [samat̪yú+ša] from /samat̪yku+ša/ 'tired', but [šayku-] 'to stand up', etc. The fact that here /k/ drops in the augmentative can be attributed to an influence of the Tarma-Yauli lect on which Canchayllo borders. In the former lects the augmentative regularly loses its /k/ (and, of course, here -ykā is -yā, as expected). Another variety where the same drop takes place is Cuzco Quechua (here -ykā does not exist). Note, however, that in both cases the change operates on these suffixes only.

<sup>10</sup>The only important variation I have found is what would appear to be a further development in the change of -y $\bar{k}\bar{a}$ , and this is the drop of the intervocalically derived yod in -y $\bar{a}$ . Thus, in the communolect of Muqui, which borders Huancani, the last kaista area) I noticed in the speech of an 84 year old woman forms such as [puli+ku+wá+ŋki] from /puli+kuyka+nki/ 'you are walking', [asi+ku+wá+ŋki] from /asi+ku+yka+nki/ 'you are looking for', etc. (where the nonpermissible vowel sequence is eliminated by the epenthetic w). In view of the scant data I have for that communolect, I cannot say whether this change is regular or idiosyncratic; however, aside from Muqui, I did not find any other community showing that type of change. It is dubious then that it can be taken seriously as a regular change in progress, except possibly for that community.

<sup>11</sup>Torero (1964:451B-A, 470A) mentions similar changes in some communolects of the provinces of Cajatambo, Chancay (Lima), and Daniel Carrión (Pasco), although in some of them palatalization seems to apply across the board also (in the same environment as in Sicaya). Creider (1967) also observes the intermediate stage -yt $\bar{y}\bar{a}$  for Chancay, as a variable rule.

<sup>12</sup>The only grammar written we have for the Wanka lects, that of the Franciscan friar Francisco José Ráez (1917), has -y $\bar{k}\bar{a}$  'durative' (and in a foot note he says, "algunos suprimen la c de este interf. por ej: dicen caian en lugar de caican", cf. p. 149), and also -k $\bar{a}$  'determiner' (where he fails to "reconstruct" the final / $\bar{y}$ /, which he represents by h otherwise, but notes that in some places the c is "syncopated", as in hualass-a for hualass-ca 'the boy'; cf. p. 54). From this it would seem that the variety he describes is that of Sicaya, where it is known he was a priest for a time; but what casts doubt on this is the fact that he gives - $\bar{c}\bar{u}$  for the locative and - $\bar{n}\bar{u}$  for the comparative (here as elsewhere he does not pay much attention with respect to the transcription of long vowels); however, as will be seen in 1.7. below, Sicaya has - $\bar{n}\bar{a}\bar{w}$  for the comparative. For this reason I think that Ráez's grammar cannot be identified with any of the varieties of Wanka; in this sense it is better to consider it as an attempt at a panlectal grammar.

<sup>13</sup>As I have said, historically it seems transparent that in both -y $\bar{k}\bar{a}$  and -k $\bar{a}$ ?, especially in the latter, we are confronted with a by-product of the suffixation of the verb \*k $\bar{a}$ - 'to be'. This being so, to what extent can it be said that the elision of /k/ was due to the fact that this segment was next to a word boundary? To this, one may answer by saying that even if we correlate word boundaries with actual physiological pauses, why is it that the same change did not affect other suffixes which historically seem to contain the same root \*k $\bar{a}$ -? I am referring to suffixes such as the durative-simultative - $\bar{c}\bar{k}\bar{a}$ , the pluralizer -l $\bar{k}\bar{a}$ , etc. In view of this, clearly the elision of /k/ has affected idiosyncratically the palatalization of -y $\bar{k}\bar{a}$ , since the quasi-homophonous -y $\bar{k}\bar{u}$  ~ -y $\bar{k}\bar{a}$  'augmentative' also seems to have been bimorphemic.

<sup>14</sup>This change is also common in other varieties of Quechua, including the Ecuadorian variety. Thus in the neighbouring lect of Tarma-Yauli this morpheme drops regularly its /k/, except in word final position; thus we

have situations such as [miku+na+n̥ci+baq] from /miku+na+n̥ci+paq/ 'for us to eat', [yača+yā+n̥ci+m] from /yača+yā+n̥ci+mi/ 'we (incl.) are knowing', but [mamā+n̥ci] 'our mother', [nuqā+n̥ci] 'we (incl.)', etc. In view of this situation one may perhaps argue that the drop of /k/ in Wanka is a by-product of dialectal borrowing. However, even if this were true, it still remains to be explained why is it that the change observed in Tarma-Yauli affects to that suffix only.

<sup>15</sup> This is especially true for the Ecuadorian group of Quechua. Cf. Parker 1969:154ff.

<sup>16</sup> The only exception to this rule is li+ku- 'to go (ethical dative)' which synchronically should be analyzed as bimorphemic (cf. lin+ 'he/she goes'). The fact that here -ku does not voice can be perhaps attributed to univerbation whereby the whole sequence liku- is interpreted as a single root (cf. miku- 'to eat', taku- 'to blend', etc.). Incidentally, that this is not an ad hoc explanation can be proved by the fact that Quechua shows an astonishing process of univerbation of suffixes; thus cf. verbs such as \*ya+yku- 'to enter', \*ya+l̥u- 'to get off', \*ya+iku- 'to climb up', \*ya+lpu- 'to get down', etc. where the second element in each case was clearly a suffix which historically became completely amalgamated with the root, which per se is now devoid of sense.

<sup>17</sup> One may ask whether the monophthongization process observed in Wanka is merely a propagation of the more generalized process found in Ancash. To this I must answer by saying that: (a) the Wanka lects do not border on the Ancash variety; (b) the Tarma-Yauli variety, on which Wanka borders, has uniformly -caw (although it presents monophthongization of the comparative, realized as -nuv); and (c) the immediately neighbouring variety of Wanka (i.e. Nuha-Wanka) lacks the comparative, and therefore the potential linkage between the Tarma form -nuv and the -nū ~ -nu alternation found in Yaʔa-Wanka is broken. In view of this, it seems safe to conclude that the monophthongization of /aw/ in Wanka is an independent development (= convergence), and, as such, another good example of a morphologically conditioned sound change.

<sup>18</sup> For a length study of the treatment of Spanish mid vowels /e, o/ in borrowings, see Cerrón-Palomino 1974.

<sup>19</sup> A change from \*-ma → -wa 'directional' can however be postulated for Proto-Quechua II; again, here we have a case where only the speaker object suffix is affected by this "non-regular" change. Cf. Parker 1969:151.

<sup>20</sup> That /n/ is easily elided can be seen again in the sequence -nʔ- which disappears altogether in lect G. Thus, we have /sinʔa/ → [siya] 'nose', /unʔa-/ → [uwa-] 'to forget', /tanʔa/ → [tā-] 'to push', etc. It seems that in certain lects the nasal disappeared first (thus in Carhuacallanga we have forms such as [siʔa], [úʔa-], [tāʔa-], respectively), but in others it is the glottal that went first (thus Chongos Bajo [siŋa], [uŋa-], and [taŋa-]). But again in the former case I was unable to find intermediate steps such as [siʔa], [úʔa] or [tāʔa-]. This, in a way, would seem to contradict the claim made in the sense that nasal dropping is always



preceded by a prior nasalization of the preceding vowel; however, it may well be the case that a kind of rule "telescoping" is involved here.

<sup>21</sup>Parker (1969:150), following Torero (1964), sets up the change  $\hat{V} > Vy$  in the evolution of Quechua II (= A in Parker's notation); this change applies only to the first person affix to produce Proto-Quechua II  $*-y$  'first person singular (actor and allocator)'. The other alternative, which would be to reconstruct  $*-y$  for Proto-Quechua and then assume a change  $Vy > \hat{V}$  in Proto-Quechua I, runs, according to Parker, into serious difficulties since "we must explain why the first person undergoes such a change while infinitive  $*-y$ , imperative  $*-y$ , second person  $*-yki$ , and many roots are unaffected". Having seen cases of sound change that affects only specific morphemes, I think that Parker's reticence can no longer be taken seriously. The examples provided in this paper make viable either of the alternatives; thus the problem still remains as to which one was the correct.

<sup>22</sup>For this and the following discussion I follow Bailey 1972b.

<sup>23</sup>However, interestingly enough, Dressler (1973:135) points, although tentatively, the following for Latin: "On peu établir que le développement phonique de désinences et suffixes anticipe, parfois, des changements généraux postérieurs. Ainsi les monophthongaisons de ae et ei flexionnels semblent précéder les changements correspondants dans les lexèmes, quoique les témoignages ne soient pas abondants ou faciles à interpréter (à cause d'influences dialectales)".

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ARGUMENTS FOR A UNIFIED TREATMENT OF Y-INITIAL AND VOWEL-  
INITIAL ROOTS IN OLUTSOOTSO <sup>1</sup>

Gerry Dalgish

Introduction:

This paper will examine and discuss the surface alternations of y-initial roots and vowel(henceforth V-) initial roots in the Olutsootso dialect of Oluluyia, a Bantu language spoken in the area northeast of Lake Victoria in Kenya. It will be argued that the historical development, and various facts of the synchronic situation indicate that a unified treatment of these roots is justified.

1. Y-initial roots

Let us first examine some y-initial roots in nasal and non-nasal environments. In (1) some nouns of the 9/10 class of Olutsootso are listed. This class is often called the "nasal class" because its prefixes frequently end in a nasal in various Bantu languages. The diminutive forms for these roots are given in order to demonstrate what the underlying forms for these roots are. The diminutive prefix, /axa/, ends in a vowel; this allows the underlying initial segment to surface unaffected by nasal interactions.

(1)	class 9	class 10	diminutive	root	gloss
	singular	plural	singular		
	/iN-/	/tsiN-/	/axa-/		
	inzofu	tsinzofu	axayofu	yofu	elephant
	inzushi	tsinzushi	axayushi	yushi	bee
	inzoxa	tsinzoxa	axayoxa	yoxa	snake

The data from this group suggest that a rule taking y to z if a nasal precedes be postulated. This rule is not phonetically unmotivated or unknown: South American Spanish has a similar rule taking y to z if a nasal precedes, as in (2):

(2): /en yeso/ ---> 'en<sup>z</sup>eso' 'in plaster, in a cast'

Some y-initial roots, however, surface with a palatal nasal, not nz:

(3)	iñani	tsiñani	axayani	yani	baboon
	iñaanga	tsiñaanga	axayaanga	yaanga	day
	iñuundo	tsiñuundo	axayuundo	yuundo	hammer
	iñaanza	tsiñaanza	axayaanza	yaanza	lake, ocean

We will note that a palatal nasal surfaces just in case a nasal is found in the next syllable. The loss of a consonant in the first of two nasal clusters is an historical rule in Bantu known as the Ganda Law<sup>2</sup>; the appearance of  $\bar{n}$  is probably governed by the synchronic reflex of that law. But however the  $\bar{n}$  is to be derived, it is from underlying sequences of /...N-y V N.../.

Other morphological contexts show the  $y/nz/\bar{n}$  alternation. In (4) a  $y$ -initial adjective is given which surfaces in non-nasal and nasal contexts:

(4)	Non-nasal	Nasal
	/omu-ndu omu-yiinda/	/iN-taBa iN-yiinda/
	pfx-person pfx-rich	pfx-tobacco pfx-rich
	'omundu omuyiinda'	'indaBa iñiinda'
	'a rich person'	'rich tobacco'

A palatal nasal surfaces as expected.

In (5), we find that  $y$ -initial verb roots also show a  $y/nz/\bar{n}$  alternation. In the simple infinitive, the  $y$ 's surface unchanged; but when prefixed by a nasals /N/, 'me', or /eN/, 'I', we find  $nz$  or  $\bar{n}$  surfacing:

(5)	Simple inf.	Pfxed-Inf.	Subj.pfx.	Root	Gloss of root
	/oxu-y.../	/oXU-N-y... <sup>3</sup> /	/eN-y...anga/	/y..../	
	oxuyaBila	oXUnzaBila	enzaBilanga	yaBila	bury
	'to bury'	'to bury me'	'I bury'	bury	
	oxuyeenga	oXUñeenjela <sup>4</sup>	eneenganga	yeenga	brew
	'to brew'	'to brew for me'	'I brew'	brew	

Thus, we have found evidence from a number of morphological contexts for the  $y/nz/\bar{n}$  alternation;  $\bar{n}$  surfaces when a nasal is in the next syllable; otherwise  $nz$  appears from underlying sequences of /N-y.../.

## 2. V-initial roots:

We will examine next the alternations of V-initial roots when nasals

and non-nasals are prefixed to them. Some examples of these are nouns of the 11/10 class listed in (6). The prefix of class 11 is /olu-/, while that of class 10 is /tsin/. A rule of glide formation and compensatory lengthening has applied in the class 11 forms, making the initial vowel of the root appear long. The diminutive form shows that the vowel is actually short<sup>5</sup>:

(6)	class 11	class 10	diminutive	root	gloss
	olvaala	tsinzala	axaala	ala	finger
	olwiika	tsinzika	axeeka	ika	horn
	olwiimbo	tsinimbo	axeembo	imbo	song
	olveembe	tsinembe	axeembe	embe	razor

The second column shows that when a nasal is prefixed to V-initial roots, a z shows up between the nasal and the vowel of the root. The last two entries of that column show that when a nasal is prefixed to a V-initial root, a palatal nasal sometimes surfaces.

There are other morphological contexts in which this alternation appears. In (7) we find that V-initial adjectives surface with z or a palatal nasal when a nasal is prefixed.

(7)	Non-nasal prefix	Nasal prefix
	/omu-ndu omu-uchi/	/iN-Baatsi iN-uchi/
	pfx-person pfx-sharp	pfx-axe pfx-sharp
	'omundu omuuchi'	'imbaatsi inzuchi'
	aa sharp person'	'a sharp axe'

and

/aBa-ndu aBa-angu/	/iN-taBa` iN-angu/
pfx-person pfx-light	pfx-tobacco pfx-light
'aBandu aBaangu '	'indaBa iNangu'
'light people'	'light tobacco'

And in (8) we find that when V-initial verb roots are prefixed by a nasal, we find a z or a palatal nasal surfacing:

(8)	Simple Inf	Pfx-ed Inf.	Subj.Pfx.	Root	gloss
	/oxu-V.../	/oXU-N-V.../	/eN-V...anga/	/-V.../	

oxwaaBula	oXUnzaBula	enzaBulanga	aBula	split
to split	to split me	I split		
oxwiBa	oXUnziBa	enziBanga	iBa	steal
to steal	to steal me	I steal		
oxuumbaxa	oXUñumbaxa	eñumbaxanga	umbaxa	build
to build	to build me	I build		
oxweenga	oXUñenjala <sup>4</sup>	eñenganga	enga	ripen
to ripen	to ripen on me	I ripen		

The V-initial roots show a clear pattern when prefixed by a nasal.

Underlying /N-V.../ shows up as nzV except when a nasal also follows the vowel; then underlying /N-VN.../ shows up as -nVN... This pattern is of course identical to the pattern y-initial roots exhibited when prefixed by a nasal. It seems reasonable to suppose that these two groups of alternations are related to each other. We shall examine the historical situation and various other synchronic facts to argue that this is indeed the case, and that the grammar should treat these roots in a similar manner.

### 3. Diachronic development:

One reason that y-initial roots and V-initial roots behave similarly might be because they are reflexes of a single root type. Some correspondences between proto-Bantu \*gamma-initial (henceforth \*g-initial) roots<sup>6</sup> and synchronic V-initial roots of Olutsootso are listed below:

(9)	Meinhopf/Bourquin proto-Bantu	Synchronic root	Surface forms	Gloss
	<u>g</u> ala	> -ala	olwaala/ tsinzala	finger
	<u>gi</u> Ba	> -iBa	oxwiBa	steal
	<u>ge</u> li	> -esi	emiesi	moons
	<u>go</u> ki	> -osi	omwoosi	smoke

When \*g occurred intervocalically within a morpheme, it became y:

(10)	k <u>u</u> gu	>	kuyu	omukuyu	fig tree
	B <u>e</u> ga	>	Beyi	oBuBeyi	falsehood

The data in (9) indicate that a rule of g > ∅ in root-initial

position should be postulated as part of the historical development. However, there are some cases shown in (11) which were former \*g-initial roots and are now synchronic y-initial roots:

- (11)
- |                 |         |                             |          |
|-----------------|---------|-----------------------------|----------|
| <u>g</u> ani >  | -yani   | iñani/tsiñani/axayani       | baboon   |
| <u>g</u> ogu >  | -yofu   | in/tsin-zofu/axayofu        | elephant |
| <u>g</u> uki >  | -yushi  | in/tsin-zushi/axayushi      | bee      |
| <u>g</u> ungu > | -yuungu | iñuungu/tsiñuungu/axayuungu | pot      |

These are without exception nouns of the 9/10 Nasal class. Now, nouns of this class occur in their most frequent usages (the normal singular and plural) with a nasal before their roots. In many cases, the nasal prefix neutralizes underlying distinctions. Some examples of this neutralization in Olutsootso are that surface -mb- can be from underlying /N-p/, /N-B/, and /N-h/; similarly, surface -nd- can be from underlying /N-t/, /N-l/, /N-l/ and /N-r/. Such neutralization creates problems in determining the actual underlying segment of these types of clusters. If a child hears the diminutive forms for such roots, he will be able to postulate the same underlying segment as his parents did. But if he does not hear them, he will be forced to "create" an underlying form; this is, then, an area where re-interpretation might be expected.

The import of the above discussion will become clear as we trace the historical development of the \*g-initial roots. At the proto-Bantu stage, we can assume that forms existed as in (12):

- (12)
- |                                      |                   |  |
|--------------------------------------|-------------------|--|
| class 11/10                          | class 3           | class 9/10/diminutive                  |
| olu- <u>g</u> ala/tsing <u>g</u> ala | omu- <u>g</u> oki | in/tsin- <u>g</u> ogu/axa <u>g</u> ogu |
- (it will be assumed that the -ng- is the ancestor of -nz-).

At the next stage in history, the rule deleting g in root-initial position enters the language; we shall assume that it followed the nasal interaction rules. Considering for the moment just class 11/10 nouns and class 3 nouns, we would have the situation as in (13). We shall make other assumptions to simplify the presentation but which do not crucially affect the discussion; e.g., that glide formation existed at the time, and that other rules involving the \*i vowel have already applied. The simplified situation is presented in (13):

(13)	class 11	class 10	class 3
U. R.	/olu- <u>g</u> ala/	/tsiN- <u>g</u> ala/	/omu- <u>g</u> osi/
Nasal rules	---	tsinzala	---
<u>g</u> -->∅	olu-ala	---	omu-osi
Surface	olwala	tsinzala	omwosi

Speakers of the next generation have no access to the \*g; it has been totally neutralized by the nasal interaction rules and by the g---∅ rule. For nouns of the 11/10 class, speakers are forced to postulate V-initial roots, since the very common singular form, olwaala, shows clearly that the root is V-initial. They would be forced to posit rules taking the underlying sequence of /N-V/ to nz, and in some cases, to n̄.<sup>8</sup> Speakers have very strong evidence that the roots are V-initial; it consists of the very common singular form, the class 11 form.

There is no such strong evidence for nouns of the 9/10 class, listed in (12). Assuming that their development is essentially similar to the above, the situation would be as in (14):

(14)	class 9	class 10	diminutive
U.R.	/iN- <u>g</u> ofu/	/tsiN- <u>g</u> cfu/	/axa- <u>g</u> ofu/
Nasal rules	inzofu	tsinzofu	---
<u>g</u> -->∅	---	---	axa-ofu
Surface	inzofu	tsinzofu	axoofu

When the next generation encounters these forms, note that they do not have immediate evidence that these roots are V-initial. This is because the singular and plural forms, the normal occurrences, do not provide any evidence that these roots are V-initial. Only if speakers actually hear the diminutive forms will they have any evidence that these roots are V-initial. And, as we mentioned earlier, if speakers do not hear these diminutives, they are forced to "create" them. Apparently, what they created were y-initial forms.

The question immediately arises as to why y's were postulated. Two answers are suggested. One is that y is the only segment which might



produce both nz and n̄ on plausibly phonetic grounds. The other is because of another re-interpretation involving newly-created y-initial roots; we shall next discuss that.

There are \*g-initial verb roots which correspond to synchronic y-initial roots. However, as (15) shows, these verbs involve a long vowel in the root:

- (15)    \*geka    >    -yeexa            to lean  
           \*ganda   >    -yaanza          to like,love,please

For this discussion, it would not matter crucially whether the lengthening existed originally, or developed later. Assuming that the g → y rule applied at some stage to these roots (and that the lengthening had taken place), we would have had long-V-initial roots: -eexa and -aanza. Since nearly every verbal prefix is V-final, an ungrammatical -VVV- sequence would result whenever a root was prefixed. Synchronically, this is not tolerated, and a rule of y-insertion takes care of such sequences.<sup>9</sup> If such a rule existed historically, it could explain the development of the y for these roots. On the other hand, it is possible that the \*g's were not lost before long vowels, and that they later became y intervocally.

What is important is that all along, these roots in (15) have been showing the same alternations as other earlier \*g-initial roots which have become V-initial. That is, nz or n̄ shows up for both groups when a nasal is prefixed. At a later stage, the y's in (15) are no longer predictable. With their surface nz/n̄ alternations, they provided a model for the class 9/10 nouns with surface nz or n̄. The class 9/10 nouns could then be analyzed as y-initial.

To sum up the historical development, \*g-initial roots at the proto-Bantu stage appeared as g-initial unless a nasal preceded; in which case, the ancestors of nz or n̄ surfaced. When the g's were lost, some roots had to be analyzed as V-initial; when these were prefixed by a nasal, they continued to show up as nz or n̄. A clear example of this would be the nouns of the 11/10 class which were V-initial. .. rule deriving nz or n̄ from

underlying /N-V/ had to postulated; the evidence was probably too overwhelming to postulate anything else. But in cases where there was not clear evidence that roots were V-initial, and yet nz or n̄ showed up as the results of some nasal interaction, speakers did not postulate underlying V-initial roots, but chose instead to analyze them as y-initial roots. It is precisely in the 9/10 class that there was no clear evidence that the roots were V-initial.

The re-interpretation was possible because verb roots which had just become analyzed as y-initial were also exhibiting the same alternations when a nasal preceded: nz or n̄. Therefore, re-interpretation took place for nouns of the 9/10 class with surface nz or n̄ as being from underlying /N-y/ too.

Other facts of the historical development support the re-interpretation proposed here. For instance, proto-Bantu V-initial roots in the 9/10 class have been analyzed as y-initial:

- |      |        |   |         |                         |             |
|------|--------|---|---------|-------------------------|-------------|
| (16) | *uanga | > | -yaanza | iñ/tsiñ-aanza/axayaanza | lake, ocean |
|      | *undo  | > | -yuundo | iñ/tsiñ-uundo/axayuundo | hammer      |

And semantically related roots from \*g surface as V-initial in non-nasal classes, but as y-initial in the 9/10 Nasal class:

- |      |         |   |         |                       |              |
|------|---------|---|---------|-----------------------|--------------|
| (17) | *guki   | > | -ushi   | oBu-ushi              | honey        |
|      |         |   | -yushi  | inzushi/axayushi      | bee          |
|      | *gaanga | > | -angu   | omu/emi/li/shi - angu | light (adj.) |
|      |         |   | -yaanga | iñaanga/axayaanga     | day(light)   |

In fact, the synchronic phonotactics indicate that there are no V-initial roots in the 9/10 class. This means that speakers have simply avoided postulating a rule taking /N-V/ to nz or n̄ if they can help it. They know that nz or n̄ can be from /N-y.../, and unless there is irrefutable evidence that the root is V-initial, speakers will refuse to analyze surface nz or n̄ as being from /N-V.../.

The re-analysis we have seen can be expressed by a rule, perhaps taht of (18):

- (18)  $\emptyset \rightarrow y / \_\_ + V$  for nouns and adjectives in the 9/10 class.

But this would be essentially similar to (18'), a rule we will be motivating for the synchronic grammar:

(18')  $\emptyset \rightarrow y/N \underline{\quad} V$

Of course, the reason that (18) is so similar to (18') is because in nouns of the 9/10 class, the prefix will always be a nasal; (18') is therefore a generalization of (18) which is a very logical extension of it. The results of the re-interpretation are that:

y-initial roots

V-initial roots

a rule of y-insertion

surface appearances of nz or n̄ from /N +     /

have been systematically linked together; indicating that a unified treatment is strongly suggested. The implementation of this unified treatment synchronically will be discussed next.

#### 4. Synchronic Unified Treatment

It will be argued that y-initial roots and V-initial roots should be treated in a unified manner in the synchronic grammar when preceded by a nasal. Specifically, a rule of y-insertion will be postulated for these V-initial roots when preceded by a nasal.

If we don't postulate a rule like (18'), we claim that the derivation of surface nz and n̄ for y-initial roots is totally unrelated to the derivation of nz or n̄ for V-initial roots. Assuming that the derivations of nz and n̄ from a nasal plus underlying y are correct, totally different processes must derive an nz from /N- V/. If the next syllable has a nasal, then n̄ is derived. Of course, neither nz nor n̄ has any phonetic similarity to its underlying source, /N-V/.

The first argument in favor of a rule like (18') is that it helps to account for the identical distribution of nz and n̄ with y-initial roots and V-initial roots. Both groups of roots show essentially similar surface alternations when a nasal is prefixed to them; a grammar with (18') can capture that similarity. In addition, the phonetic implausibility of

deriving nz or n̄ directly from /N-V/ is no longer a problem.

The next point in favor of a rule like (18') is that there are occasional and idiosyncratic deviances in the derivation of nz and n̄. As we saw earlier, the appearance of n̄ was apparently triggered by the prescence of a nasal in the next syllable. In a very few cases, a pronunciation with nz is also possible, although the preferred form still seems to be n̄. This deviation occurs when the nasal in the next syllable is n; there is no deviation when other nasals or a nasal cluster is in the next syllable. In addition, the prescence of n in the next syllable is only a necessary, but not a sufficient, condition for deviance; at the moment, then, there is no way to predict when deviant pronunciations will be marginally allowed. At any rate, a verb like that in (19) shows this apparent pattern:

- |      |             |             |     |           |               |
|------|-------------|-------------|-----|-----------|---------------|
| (19) | oxu-yiinia, | /N-yiinia/  | --> | <u>n̄</u> | iin <u>IA</u> |
|      | pfx-remove  |             |     | Nz        |               |
|      | 'to remove' |             |     |           |               |
|      |             | pfx-remove  |     |           |               |
|      |             | 'Remove me' |     |           |               |

Both pronunciations are possible. However this deviation is to be described, it also is part of the derivations of nz and n̄ for V-initial roots also. A V-initial root, /-ana/ 'to moo', when prefixed by a nasal, also has two possible pronunciations:

- |      |         |                             |     |                                       |
|------|---------|-----------------------------|-----|---------------------------------------|
| (20) | oxu-ana | /oXU-N-an-ila/ <sup>h</sup> | --> | oXU <sup>n̄</sup> <sub>nz</sub> anila |
|      | pfx-moo |                             |     |                                       |
|      | oxwaana |                             |     |                                       |
|      |         | pfx-N-moo-suffix            |     |                                       |
|      |         |                             |     | 'to moo for me'                       |

But as in the case of y-initial roots, if other nasals or a nasal cluster is in the next syllable, there is no deviancy, and no nz pronunciation is possible.

Thus, there is identical distribution of nz and n̄ when y-initial roots and V-initial roots are preceded by a nasal. And even the deviations in the appearances of these nasals, however they are to be formulated, are in terms of both y-initial and V-initial roots. With a rule of y-insertion, we could account for this development, while without such a rule, we would be claiming that even the variances are accidental between both classes of roots.

Yet another generalization can be captured if a rule of y-insertion before V-initial roots following a nasal is postulated. This generalization involves the synchronic reflexes of the Ganda Law, an historical rule deleting the first stop of two nasal clusters. The synchronic reflexes of that law are seen with l-initial roots, as the examples in (21) show:

- (21) /oxu-leka/ /oXU-N-leka/ vs. /oxu-luma/ /oXU-N-luma/  
 pfx-despise pfx-me-despise pfx-bite pfx-me-bite  
 'oxuleka' 'oXUndeka' 'oxu-luma' oXUnuma  
 \*oXUnduma  
 'to despise' 'to despise me' 'to bite' 'to bite me'

When l is prefixed by a nasal, a rule of nasal hardening results in surface nd, as the example of the root /leka/ shows. But if a nasal is in the next syllable, it seems that a rule deleting the l must be postulated. The first nasal then assimilates to the place of the former l's articulation, becoming alveolar.

Essentially the same type of rule could derive the n̄ from sequences of /N-yV.../; the y, like the l, is deleted when a nasal is prefixed and when a nasal is in the next syllable, while the first nasal assimilates to the place of articulation of the y, (i.e., the palatal area). It seems therefore that a generalization about certain derived nasal clusters when followed by nasals is possible. Now, when V-initial roots are prefixed by a nasal, the resultant nasal sequence seems to be part of that generalization as well. But without a rule of y-insertion for these V-initial roots, the generalization does not extend to them, since, after all, they would be unrelated phenomena. But if a rule of y-insertion applied to V-initial roots when prefixed by a nasal, then these sequences of /N-y-V.../ could be subject to the same rule(s) that applies to the l and to underlying y when prefixed by a nasal when a nasal occurs in the next syllable. The surface results of the synchronic reflexes of the Ganda Law could be seen as a unified process, and a more comprehensive statement about the language is made than would otherwise be possible.

A stronger argument for a rule of y-insertion before V-initial roots and after a nasal comes from an examination of certain imperative forms. The simple affirmative singular imperative is formed in many cases by taking the root and adding final -a.

(22)	infinitive	root	imperative	gloss
	oxuBaamba	Baamb	Baamba	sacrifice
	oxumeta	met	Meta	Blink
	oxuyaBila	yaBil	YaBila	bury

But for V-initial roots, the imperative is formed by prefixing a y before the root, with a final vowel -a:

(23)	oxviiBa	iB	YiBa	steal
	oxweela	el	Yela	select
	oxwaaBula	aBula	YaBula	split open
	oxwoononia	ononia	Yononia	spoil
	oxuuma	uma	Yuma	dry

A morphological rule of y-insertion for V-initial roots must be postulated:

(24)  $\emptyset \rightarrow y / \underline{1} V$  for simple affirmative commands.

When the nasal object prefix, /N/, 'me', is added to these V-initial roots, we get surface nɛ or n̄:

(25)	/N--iB <u>ɛ</u> / <sup>10</sup>	NziB <u>ɛ</u>	Steal me
	/N--el <u>ɛ</u> /	Nzel <u>ɛ</u>	Select me
	/N--aBul <u>ɛ</u> /	NzaBul <u>ɛ</u>	Split me open
	/N--umI <u>ɛ</u> /	N̄umI <u>ɛ</u>	Make me dry
	/N--ononI <u>ɛ</u> /	N̄ononI <u>ɛ</u>	Spoil me

The first-person-prefixed imperative ends in an -a, just like the simple imperative singular. However, all other prefixed imperatives, in singular and plural commands, have a final -e, as in (26):

(26)	class #	object pfx.	/U.R./	surface
	2	Ba	/Ba-Baamb- <u>E</u> /	BaBaamb <u>E</u>
				'Sacrifice them'
	3	ku	/ku-iB- <u>E</u> /	KwiB <u>E</u>
				Steal it

4	chi	/chi-iB-E/	Chi <i>i</i> BE
			' Steal them'

This would indicate that prefixed imperative formation involves two groups: the /N/-prefixed imperatives in (25) and all others as in (26). One way to separate these groups would be to claim that for prefixed imperatives, the rule is simply to prefix the root and add final -e. For the /N/-prefixed imperatives, the rule might be: take the simple affirmative command already formed and prefix the /N/ (while indicating the tonal difference, see footnote 10). For the V-initial roots, the "already formed" imperative is with a y inserted, so the surface form of these /N/-prefixed imperatives is the nz/ñ form. Thus, V-initial roots, y-insertion, a nasal prefix, and surface nz or ñ are systematically linked in that the only imperatives with final -a have had either y-insertion, or surface nz or ñ. The proposed rule of y-insertion for V-initial roots when preceded by a nasal receives support from this paradigm, since here we find evidence that V-initial roots, a prefixed nasal, and y-insertion are parts of the same process deriving surface nz or ñ.

#### 5. Conclusions

It has been argued that surface forms of y-initial roots and of V-initial roots, when prefixed by a nasal, are the results of similar steps in the derivations. It has been claimed that a rule of y-insertion applies to V-initial roots when prefixed by a nasal, so that the rules deriving the surface nz/ñ from underlying nasal plus y can apply to the V-initial roots as well.

We have seen that the historical development of the language indicates that a rule of y-insertion for V-initial roots when prefixed by a nasal must have applied. In the synchronic grammar, it has been shown that a rule of y-insertion for V-initial roots when prefixed by a nasal explains the identical distribution of surface nz/ñ for y-initial roots and V-initial roots. In fact, even the discrepancies in that distribution seemed to be governed by the same factor, in that both y-initial roots and V-initial roots

had the same discrepancy. In addition, certain phonological processes could be stated as generalizations about the language if a rule of y-insertion were assumed. Finally, the imperative paradigm gives evidence that V-initial roots, a prefixed nasal, y-insertion, and surface nz or n̄ are all systematically linked together. To sum up then, a rule like (18') results in the unified treatment of y-initial roots and V-initial roots; a unified treatment that is indicated by the historical development and the synchronic facts.

#### FOOTNOTES

1. I must thank the following people for their help in making this research and paper possible: Professor V. Uchendu of the African Studies Center, for providing support for my informant in the summer of 1974; Karen Dudas, Margie O'Bryan, Chuck Kisseberth and Herb Stahlke, for useful comments and suggestions. In addition, my informant, Mr. Orren Tsuma, has worked patiently with me through my many mispronunciations and confusions; he has repeatedly offered illuminating comments and is in no way responsible for any mistakes in this paper. An NDFL Title VI Fellowship has enabled me to continue my investigation and provide funds for Mr. Tsuma.

2. The Ganda Law has been simply stated: NCVNC MVNC; it has different synchronic reflexes in different languages.

3. The capitalized segments indicate that raised tone and accent are on that syllable.

4. The form given here is actually the applied form of the verb, since the direct object reading is semantically poor.

5. In fact, all V-initial roots seem to be underlyingly short V-initial. If the vowels here were long, we would not get the coalescences as described. The forms in the second column show that the roots are short also.

6. The segment in Meinhopf and Bourquin is the voiced velar fricative. In Guthrie, these are listed as y-initial. The high close vowels are indicated by underlines.

7. The dotted l (l) indicates the voiced alveolar flap.

8. Here we assume that the Ganda Law was in effect.

9. The rule of y-insertion mentioned here applies synchronically when there are sequences of at least three successive vowels underlyingly; this includes



at least at this stage of the investigation, a long vowel and a short vowel, or three underlying morae. There are cases in which a y has been inserted and surfaces although one of the three underlying vowels has been deleted, making the rule opaque; but for this discussion, the rule is not really incorrect as stated, since it does actually exist.

10. The capitalized and underlined vowels in these paradigms indicate that high tone and accent fall on these vowels, and that all preceding tones must be low, although lexically they may have been high.

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A Case of Functional Phonological Opacity:  
Javanese Elative Formations

Karen Dudas

0.0 It is the purpose of this paper to investigate the interaction of the Modern Javanese Elative Formation<sup>1</sup> (a morphological process) with a number of phonological rules contained in the grammar of the language.<sup>2</sup> This interaction is of theoretical interest for two reasons: First of all, the following investigation reveals that, contrary to what is frequently taken for granted by generative linguists and what appears to be the case in most languages, the grammar of Javanese is indeed organized in such a way that a morphological process (i.e. Elative Formation) must be said, in terms of rule ordering, to follow the operation of a number of phonological processes;<sup>3</sup> Secondly, it is of interest that in Javanese, surface Elative forms exhibit marked opacity with respect to certain phonological rules; however, this apparent opacity, it will be claimed, turns out to be well motivated when the grammar of Javanese is looked at as a functioning whole, with the surface phonological opacity not only operating to preserve certain semantic contrasts, but, at the same time serving in many cases as the distinguishing surface marker of Elative forms.

0.1 Elative Formation is a highly productive process in spoken informal Javanese, although it does not appear in either written language or in the more formal levels of speech. By the operation of this process, intensives are formed from primary adjectives, so that for a given adjective (such as aduh 'far') the Elative form may be roughly characterized as 'very X' (e.g. Elat. aduh 'very far'). In very general terms the process by which Elatives are formed may be described as a change of the last vowel in the primary adjective root to tense i or u, the choice of the front or back vowel depending on whether the primary form has a front or back final vowel.<sup>4</sup> We may thus speak of final tense i or u as the characteristic surface marker of Elatives.

Elatives may be formed from nearly all primary adjectives in the language, with a few logical exceptions. Elatives may not be formed from: 1) Adjectives which have some other commonly occurring intensive form (e.g. tuwa 'old' has the intensive form tuwék 'very old' and not the expected Elative \*tuwu); 2) Adjectives whose meanings are logically not subject to intensification (e.g. pati 'dead'); 3) Adjectives whose last vowel is e (schwa) may be intensified only by juxtaposition with banget 'very'.

1.1 Before describing the character of Elative Formation in more detail, some general discussion of Javanese phonology and of specific phonological processes will be helpful. The language possesses the following underlying vowel system:<sup>5</sup>

i		u
e	e	o
	a	

By the operation of the relevant phonological rules, this underlying system is converted into a surface system consisting of ten sounds:

i		u
<b>I</b>		<b>U</b>
e	e	o
ɛ	a	ɔ

For ease of notation, throughout the following discussion I will represent this system by the following orthographic symbols:

I		U
i		u
E	e	O
e		o
	a	

Note that even when basic forms are being cited, upper case letters will indicate tense vowels and lower case letters will be used for lax vowels.

1.2 The phonological rules which will prove relevant to our discussion all involve mutation of underlying vowels. These rules may be summarized as follows:<sup>6</sup>

1.2.1 a# to o#: Word-final /a/ becomes o.

cf. /dIna/ dIno 'day'      dInanE 'the day'  
 /mEdja/ mEdjo 'table'    mEdjanE 'the table'  
 /néka/ néko 'come'      nékanI 'come to visit'

1.2.2 Final Closed Syllable Laxing (FCSL): A tense vowel in a final closed syllable becomes lax.

cf. lOrO 'two'; rong jam 'two hours' (/lOrO+ng jam/)  
télU 'three'; télung dIno 'three days'  
 (/télU+ng dIna/)

bagO 'inner bark of the so-tree'; dialectal bagor  
kepleh 'drooping'; dialectal keplE

1.2.3 Vowel Harmony: In a root containing adjacent originally identical non-high vowels, any change affecting one of these vowels must be matched in the other, so that the two are identical on the surface.

cf. sample derivations below in Sect. 1.3 and also  
dowo 'long' (/dawa/); dawanE 'the long one'  
kepleh 'drooping'; dialectal keplE

All of the above phonological processes appear to operate with great regularity throughout the language, the only exceptions being obvious foreign borrowings such as bensIn 'gas', pérSIs 'precise', kornet bIf 'corned beef' and kOlEra (sometimes kOlerah) 'cholera', all of which have alternate "less educated" pronunciations resulting from regular application of the relevant Javanese phonological rules. One very common word appears to be a genuine exception to a# to o#: Ora 'no' occurs instead of the expected \*Oro. In addition, Uhlenbeck (1949) identifies a group of words which may have tense I or U in final closed syllables and are thus exceptions to FCSL. This class is however quite small and appears to be made up of certain exclamations, interjections, onomatopoeic words, animal noises, etc.

1.3 While there is no reason to order FCSL and a# to o# with respect to each other, there is evidence that the rule of Vowel Harmony has access to the output of both of these rules. This

evidence consists of the fact that in many cases Vowel Harmony operates to harmonize a penultimate vowel to the last vowel in the root, the character of which can only have been produced through previous application of a# to o# or FCSL. This relationship may readily be seen in the derivation of surface forms such as dowo 'long', gepeng 'flat' and kosong 'empty'; from underlying /dawa/, /gEpEng/ and /kOsOng/:

	/dawa/	/gEpEng/	/kOsOng/
<u>a#</u> to <u>o#</u>	dawo	-----	-----
FCSL	-----	gEpeng	kOsong
Vowel Harmony	dowo	gepeng	kosong
Surface:	<u>dowo</u>	<u>gepeng</u>	<u>kosong</u>

Thus we may establish the ordering of Vowel Harmony after both FCSL and a# to o# in the grammar of Javanese.

2.0 Having briefly described the phonological rules which will enter into interaction with Elative Formation, it is now appropriate to move on to more thorough consideration of the morphological process of Elative Formation itself, and the interaction of this process with the phonological rules.

2.1 It was stated above that the characteristic surface marker of Elatives is I or U replacing the rightmost vowel of the primary adjective, with the choice between the two markers being determined by the frontness or backness of the corresponding vowel in the primary form. At the same time, Elatives may (usually--cf. Sect. 2.2 below) optionally exhibit an exaggerated drawing out of the characteristic I or U and an accompanying rise in pitch on the final syllable. In fact, in most Elative expressions these prosodic devices are used. However, it should be recognized that these prosodic phenomena, while they occur very frequently and do help to distinguish Elative forms from primary adjectives, especially where there may be ambiguity otherwise, are not in general sufficient to distinguish Elatives; the change in final vowel must be regarded as the true process

of Elative Formation, with the prosodic phenomena playing only an ancillary role.

2.2 In most cases, the operation of Elative Formation is clear and may readily be seen from examples like the following:

Primary	Elative
<u>angel</u> 'hard, difficult'	<u>angIl</u>
<u>lUwE</u> 'hungry'	<u>lUwI</u>
<u>ramE</u> 'noisy'	<u>ramI</u>
<u>abot</u> 'heavy, hard'	<u>abUt</u>
<u>adoh</u> 'far'	<u>adUh</u>
<u>IdjO</u> 'green'	<u>IdjU</u>
<u>djérO</u> 'deep'	<u>djérU</u>
<u>rIndio</u> 'slow'	<u>rIndIq</u>
<u>résio</u> 'clean'	<u>résIq</u>
<u>wanI</u> 'bold, daring'	<u>wanI</u>
<u>alus</u> 'refined, smooth'	<u>alUs</u>
<u>lUrus</u> 'straight'	<u>lUrUs</u>
<u>lUgU</u> 'ordinary'	<u>lUgU</u>

Note that for primary adjectives with mid (tense or lax) final vowel the change to the Elative markers I and U involves raising of the final vowel. In addition, for adjectives with final closed syllables, the Elative form is distinguished from the surface primary form by virtue of the tenseness of the final vowel in the former (cf. adoh with lax mid vowel, but Elat. adUh, with tense high vowel).

For primary adjectives whose final vowel is already high, there can of course be no raising of the final vowel. In such cases, for adjectives with a final closed syllable, the only feature which distinguishes Elatives from primary forms is the tenseness of the marker vowel (cf. rIndio with Elat. rIndIq). And in the case of adjectives with word-final I or U the Elative forms are, with respect to segmental characteristics, absolutely identical with the primary forms (cf. wanI with identical Elative wanI). It is in such cases that the prosodic devices of drawing

out the final vowel and raising the voice pitch must come into play if the listener is to recognize the intensified nature of the adjective he hears. (Recall that these phenomena are more or less optional for Elatives built on adjectives with other final vowels.)

2.3 When the primary adjective has underlying /a/ as its last vowel (which appears on the surface as o if it is word-final) the operation of Elative Formation is slightly less straightforward. Consider the following examples:

Primary	Elative
<u>larang</u> 'high in cost'	<u>larIng</u>
<u>gampang</u> 'easy'	<u>gampIng</u>
<u>kéras</u> 'hard, harsh'	<u>kérIs</u>
<u>rOso</u> 'strong' <sup>7</sup>	<u>rOsU</u>
<u>kémbo</u> 'insipid, without spirit'	<u>kémbU</u>

With adjectives ending in (tense or lax) e, o, i or u, it was possible to say that the choice of Elative marker was determined by the frontness or backness of the vowel of the primary adjective; all adjectives in a final front mid vowel for example, whether that vowel was in an open (surface E) or closed (surface e) syllable, formed Elatives by replacing that front vowel with I. However, for adjectives with /a/, such a simple statement is impossible, and it appears that we must distinguish between /a/ in a closed syllable (which forms Elatives in I (cf. larang; Elat. larIng)) and /a/ in open syllables (which is surface o) which forms Elatives in U (cf. kémbo; Elat. kémbU).<sup>8</sup> As long as we consider only the underlying forms of the primary adjectives, this split seems rather puzzling. Granted that /a/ is neither a front nor a back vowel in Javanese, why should speakers, having decided on the front vowel marker for Elatives of adjectives with /a/ in a closed syllable, further complicate matters by choosing the back vowel marker for /a/ when it occurs word-finally—or vice versa?



The reader may have already noticed that the choice of U as the Elative marker for adjectives in word-final /a/ is not so puzzling if, taking a rule ordering approach, we assume that Elative Formation applies after the phonological rule of a# to o# has already applied. At this point, although /a/ in a closed syllable is still neither front nor back, and may therefore apparently arbitrarily be assigned I as an Elative marker, the word-final /a/ has already become o, which is clearly a back vowel (and may be treated along with o from underlying /O/) and therefore should logically have an Elative in U.

3.0 The suggestion of the possibility that there may be reason to order the morphological process of Elative Formation after the phonological rule of a# to o# leads us to the main topic of this paper: that is, the interaction of Elative Formation with certain phonological processes and the role of this interaction in the grammar of Javanese. In the course of the following section, it will be claimed that, within a framework of rule ordering, there is reason to believe that Elative Formation must apply, not only after a# to o#, but also after FCSL and Vowel Harmony.

3.1 Returning now to consider in more detail the possibility that Elative Formation does not operate until after word-final basic /a/ has already become o by a# to o#, we need to look at the Elatives corresponding to primary adjectives with two /a/ vowels, the last in word-final position. (Recall that such primary adjectives appear on the surface with two o vowels, as a result of the operation of a# to o# and subsequent adjustment of the penultimate vowel to o by Vowel Harmony (cf. the sample derivation of dowo in Sect. 1.3 above).) Consider for example:

	Primary	Elative
<u>dowo</u>	'long'	<u>dowU</u>
<u>loro</u>	'ill, painful'	<u>lorU</u>
<u>ombo</u>	'large, broad'	<u>ombU</u>

Notice that in the above Elative forms, not only is the Elative marker the U which in general replaces back vowels, but at the same time the penultimate /a/ of the underlying form shows up as surface o. The latter is a situation which only arises through harmonizing of a basic /a/ to a word-final /a/ which has become o by a# to o#. Thus such Elatives provide strong indication that not only must final /a/ become o before Elative Formation occurs, but that Vowel Harmony must also apply before Elative Formation. Derivation of such forms would thus proceed as follows:

	/dawa/
<u>a#</u> to <u>o#</u>	dawo
Vowel Harmony	dowo
Elative Formation	dowU
Surface:	<u>dowU</u>

and not, as might generally be assumed, with the morphological process of Elative Formation preceding the phonological rules:

	/dawa/
Elative Formation	dawU
<u>a#</u> to <u>o#</u>	-----
Vowel Harmony	-----
Surface:	* <u>dawU</u>

Therefore consideration of Elative forms from underlying roots of the shape /CaCa/ (where C represents any permissible consonant) seems to indicate that, within a framework of rule ordering, Elatives must be said to follow at least the phonological rules a# to o# and Vowel Harmony.

3.2 Similar conclusions may be reached from evidence obtained from the following primary adjective-Elative pairs:

Primary	Elative
<u>eleq</u> 'bad'	<u>eliq</u>
<u>gepeng</u> 'flat'	<u>geping</u>
<u>grobob</u> 'rough, crude'	<u>grobUh</u>
<u>kosong</u> 'empty'	<u>kosUng</u>

Notice that in these examples the Elative forms contain lax vowels which can only be the result of Vowel Harmony adjusting an underlying tense penultimate /E/ or /O/ to match a final e or o which must have been laxed by FCSL. Thus the derivation of kosUng for example, must have proceeded as follows:

	/kOsOng/
FCSL	kOsong
Vowel Harmony	kosong
Elative Formation	kosUng
Surface:	<u>kosUng</u>

and not, as might be expected,

	/kOsOng/
Elative Formation	kOsUng
FCSL	kOsung
Vowel Harmony	-----
Surface:	* <u>kOsung</u>

3.3 Consideration of such examples provides what might be considered additional support for the argument that Elative Formation must follow the phonological rules in question. Recall that the surface Elative markers are always tense I or U occurring in place of the last vowel of the primary adjective. In many cases this means that Elative forms have tense vowels in final closed syllables--that is, in precisely the environment for FCSL. Thus, if Elative Formation introduced its tense vowel markers before the application of FCSL, the latter might be expected to apply, producing a lax surface Elative marker. This of course is not what happens. What does happen (i.e. the tense Elative markers come through to the surface unchanged) is consistent with the introduction of Elative markers after FCSL has already applied. (Note that this ordering has already been established indirectly, since FCSL must precede Vowel Harmony, which was shown above to precede Elative Formation.) Although the same surface result might be obtained by claiming that all Elatives must be exceptions to FCSL, this would only be an added

complication, since the ordering of Elative Formation after FCSL has already been established indirectly.

4.0 The reader has no doubt already discovered for himself the obvious surface opacity with respect to certain phonological rules exhibited by Javanese Elative forms. The fact that Elatives have tense vowels in the exact environment for FCSL is a clear case of opacity of Kiparsky's (cf. Kiparsky (1971)) Type i. That is, Elative forms like angIl, rIndIq, adUh, etc. (from primary adjectives angel, rIndia, adoh, etc.) have final tense vowels which are in the environment for FCSL, but which nevertheless are still tense.

Kiparsky's Type ii opacity is represented by Elative forms like dowU, kosUng and eliq (primary adjectives dowo (/dawa/), kosong and eleq) where the penultimate vowels appear to have undergone changes connected only with Vowel Harmony; but the final vowels which must have conditioned such changes are not present on the surface, having been replaced by the Elative markers I and U, which do not condition Vowel Harmony.

As can easily be seen by comparing the sample derivations of actually occurring and starred Elative forms in Sect. 3.1 and 3.2 above, both of the above instances of opacity with respect to phonological rules arise through the proposed ordering of the morphological process of Elative Formation after the phonological rules in question. Although this situation is quite unusual in several respects, there is good motivation for its presence in the grammar of Javanese.

4.1 I would in fact find it quite reasonable to claim that the unusual interaction of Elative Formation with the phonological rules serves the purpose of producing the very surface forms which we have termed "opaque" and that in this case the apparent opacity has two functions: namely, that of maintaining the distinctness of Elative forms from primary forms; and that of preserving the identity of underlying lexical items. Both of

these functions would of course contribute to the successful utilization of Elatives by speakers of Javanese.

4.1.1 To see first of all how opacity in Elatives functions to keep them distinct from primary forms of the language, we need only to consider a few Elatives with final closed syllables, such as rIndIq and aUs (primary rIndIq and alus). A hypothetical Javanese speaker-hearer encountering such forms should know immediately that they are not primary words, but have undergone the process of intensification we have been calling Elative Formation. What signals this information to him is the presence of the tense high vowel (i.e. the Elative marker) in the final closed syllable; in primary forms no tense vowels occur in that environment, since they are all laxed by FCSL, and the speaker knows that the only tense vowels in that environment which reach the surface are those introduced by Elative Formation. In other words, it is precisely the fact that Elatives are opaque with respect to the phonological rule of FCSL that allows the speaker to distinguish between primary forms with final closed syllables containing i and u and Elatives.

At the same time, opacity of a different type plays a role in distinguishing certain other Elatives from primary forms (namely those Elatives which correspond to primary forms with underlying shapes like /CECEC/ or /COCCO/). Consider for example the possible reaction of our hypothetical speaker-hearer when he encounters an utterance which includes the words gepIng or kosUng. He knows first of all that he has heard an Elative by virtue of the tense marker in the final closed syllable as was just discussed in the above paragraph. However, in this case, in addition to the character of the final vowel, he has yet another signal that what he has heard is an Elative: the vowel configuration of the whole word. He knows that in the penultimate position a lax e or o (from basic /E/ or /O/) comes about only by the operation of Vowel Harmony. However, in Elatives like gepIng and kosUng (primary gepeng and kosong)

there is no vowel in the final syllable which might have brought about the laxness of the penultimate vowel, the possible conditioning vowel having been replaced by the Elative marker (Kiparsky's Type ii opacity). The fact that Vowel Harmony is opaque in such forms, together with the fact that this opacity occurs only in Elatives, helps to distinguish Elatives from primary forms.

4.1.2 The above however is more or less a redundant function of Vowel Harmony opacity in Elatives like geping and kosUng since the presence of the tense vowel in a final closed syllable might be of itself sufficient indication that such a form is an Elative. The real significance of opacity with respect to Vowel Harmony in such Elatives is, in my opinion, that it functions to allow the Javanese speaker to distinguish between the various possible underlying forms on which an Elative like geping or kosUng might be built. In the following paragraphs I will attempt to illustrate the basis for this claim.

4.2 Since Elative Formation involves replacement of final front vowels with I and back vowels with U, it must necessarily result in a certain amount of neutralization of underlying contrasts, with e, i and a in primary final closed syllables all coming out as I in Elatives; and similarly, primary o and u falling together into Elative U. Such a situation could result in a great deal of confusion about the primary source for a given Elative; however, because of the organization of the grammar of Javanese which results in phonological opacity of certain Elatives with respect to Vowel Harmony, a great deal of this potential homonymy and its resultant confusion is avoided.<sup>9</sup>

Consider for example the Elatives EKIr (primary Ekar 'lopsided') and ekIr (primary eker 'impatient for something'). Notice that because of the neutralization brought about by the introduction of the Elative marker vowel, these two forms are identical except for the difference in tenseness of the penultimate vowels; and this difference in tenseness of the vowels

in question has the effect of making each Elative sound more like its corresponding primary adjective and thus giving the hearer an immediate clue to its semantic import. This distinctive difference in tenseness however is a consequence of the opacity of the Elative ekIr with respect to Vowel Harmony. That is, the initial e in this form is lax, even though the lax final vowel (cf. primary eker) which must have originally conditioned this laxing has been replaced by the Elative marker I. If the grammar of Javanese were organized differently, so that the opacity in question were eliminated, it would lead to possible homonymy of the Elatives of primary forms of the shape CeCeC, CeCiC and CECaC, all of which would have Elatives of the shape CECIC.<sup>10</sup> The same possibility of confusion would exist between the Elatives of primary forms of the shape CoCoC and COCuC, but this confusion is again avoided by the ordering of Elative Formation after Vowel Harmony and the resulting opacity which functions to make the penultimate vowel of the Elative identical to the penultimate of the corresponding primary.

Thus it seems that as a result of the unusual position of Elative Formation in the grammar of Javanese, a fair amount of the potential confusion which could result from the neutralizing effect of the derivational process itself is avoided. Although this of course serves mainly to distinguish Elatives corresponding to primary forms of the shapes CeCeC and CoCoC (but cf. also Sect. 4.3.1 below), this is quite significant in light of the fact that, according to Uhlenbeck (1949), roots having identical vowels are by far the most prevalent in the language; and thus the forms affected by the opacity in question must be quite numerous.

4.3 So far in the discussion of the functional role of opacity in Javanese Elatives, I have limited consideration to Elatives corresponding to primary adjectives with final closed syllables. I have done this mainly to facilitate discussion, but also because such forms so clearly illustrate not only the functional

role of opacity with respect to Vowel Harmony, but also the way opacity with respect to FCSL functions to mark Elative forms. (While in Elatives with final open syllables, FCSL is of course not relevant.) At the same time, morphemes with final open syllables (with the exception of those of the form /CaCa/) are statistically quite rare in Javanese. There are however certain facts about open syllable Elatives which are relevant to discussion of the functional role of opacity in Javanese Elatives.

4.3.1 First of all, just as was the case in final closed syllable Elatives corresponding to primary adjectives with two identical non-high vowels (i.e. where Vowel Harmony operates), open syllable Elatives of primary forms with two /a/ vowels also exhibit opacity with respect to Vowel Harmony. And this opacity also functions to avoid possible confusion by making the Elative sound more like its corresponding primary form. That is, in the Elative dowU, for example, (primary dowo (/dawa/)) the penultimate o from underlying /a/ can only have arisen through harmonizing to a final o (from /a/ by a# to o#). But in the Elative this final o has been replaced by U and the form is therefore opaque with respect to Vowel Harmony (thus dowU instead of \*dawU). This opacity however has the effect of making the penultimate vowel of the Elative identical to the penultimate of its corresponding primary form and thereby avoiding the possible confusion arising from neutralization of the final vowel, which would otherwise allow the possibility that the Elatives of CoCo (/CaCa/) primaries might be segmentally identical to those of CaCU and CaCO primaries.

4.3.2 There is another way in which a type of opacity in Elatives of final open syllable adjectives serves to avoid the possible confusion resulting from partial neutralization of underlying contrasts. I must limit description of this particular phenomenon however, since I am not yet sure of the exact nature of the process involved.



4.3.2.1 It appears that in Javanese words with final open syllables the surface tenseness or laxness of a penultimate vowel may be determined by comparison of that vowel with the word-final vowel. If in the underlying form the penultimate is the same height or higher than the final vowel, then the tense variant of the penultimate occurs on the surface; if it is lower than the word-final vowel, then the lax variant occurs. (It must be emphasized that I am not claiming this to be a rule of the language; it is merely intended to serve as a description of the facts.) Thus for example, we find words of the type COCO, COCE, CICO, etc., where the penultimate is the same height or higher than the final and is thus tense; but CoCI, CoCU, CeCI, etc., where the penultimate is lower than the final and thus the lax variant occurs.<sup>11</sup>

The Elative corresponding to lOcrO 'loose' is however not \*logrU, with the expected lax o, but lOcrU, with the penultimate O tense, even though the final vowel (Elative marker) is higher than the penultimate vowel. This of course represents opacity with respect to whatever process determines tenseness or laxness of penultimate vowels in words with final open syllables. At the same time, however, just as with the opacity of certain Elatives discussed above, the result is minimization of the possible confusion caused by Elative neutralization by means of producing a surface Elative with the same penultimate vocalism as its primary counterpart. The opaque vowel configuration of such words may function as a signal to speakers that they are dealing with Elatives and not primary words. This is an especially important consideration for certain Elatives--namely those corresponding to primary adjectives with final U or I--with final open syllables, because, as was mentioned above in Sect. 2.2, such forms are not readily recognizable as Elatives otherwise.

5.0 In conclusion, I would like to summarize what has been revealed about Javanese Elatives in the preceding sections and to suggest some possible ways of looking at the relevant facts of the language as alternatives to the rule ordering approach that was maintained in the body of the paper.

5.1 In summary, then, it has been shown that many Javanese Elatives exhibit Type i and/or Type ii opacity with respect to a number of phonological rules. Because this opacity must arise through (taking a strict rule ordering approach) the unusual ordering of a derivational morphological process after a number of phonological rules, it might be generally concluded that such a situation is extremely unlikely. It was claimed however that, unlikely as it seems, there is good motivation for the existence of such a situation in the grammar of Javanese, since the opacity of certain Elatives probably serves to distinguish them from primary forms and at the same time helps to avoid some of the confusion about underlying distinctions that might otherwise result from the partial neutralization of final vowel contrasts inherent in the process of Elative Formation itself.

5.2 Although I have spoken in terms of rule ordering throughout the paper, there are some alternative approaches that should at least be mentioned.

5.2.1 First of all there is the possibility that Elative Formation is a somewhat strange derivational process that simply operates on surface forms of primary adjectives and replaces their final vowels with Elative markers. This would be entirely consistent with the data presented in this paper and would perhaps account for why all the examples of opacity that I have claimed help to maintain underlying distinctions actually result in making Elatives look as much as possible like their corresponding surface primary forms. Thus such an approach would basically be very similar to the rule ordering one taken in this paper, with the difference that simply claiming that

Relative Formation is ordered after certain phonological rules still leaves room for the possibility that it may be ordered before certain others--even though I know of no phonological rules that must be ordered after it. The surface derivation approach of course by definition precludes this possibility. At the same time the rule ordering approach makes no claims about what the relationship between Relative Formation and any new phonological rules entering the grammar might be; the surface derivation approach however would claim that such phonological rules would of course precede Relative Formation, which would take only surface forms as its input.

5.2.2 Another approach that might be taken in accounting for the facts of Javanese Relative Formation is that of positing some sort of transderivational constraint for the language. It seems that the major effect of ordering Relative Formation after Vowel Harmony is the avoidance of homonymy among certain Relatives by making them sound more like their primary counterparts. However, these same results might be obtained by alternatively claiming that, instead of the suggested ordering, the grammar of Javanese possesses some device that operates during the derivation of an Relative to "look over" to the derivation of its primary form in order to ensure that the final output of the former will have the same penultimate vowel as the final output of the latter. Thus, for example, at that point in the derivation of Elat. *genIng* (cf. Sect. 1.3 above) at which Vowel Harmony should apply (but ordinarily could not because the input at this point would be /gE<sub>p</sub>Ing/, which does not meet the environment for this rule) the grammar would look over to the same point in the derivation of primary *geneng* (which at this stage would be /gE<sub>p</sub>eng/), see that Vowel Harmony does apply in the latter, and accordingly lax the penultimate of the Relative in order to ensure surface resemblance to primary *geneng*. Note that if this approach were taken, some way would have to be found to account for the opacity of Relatives with

respect to FCSL (cf. Sect. 3.1.2). This problem however could be taken care of by claiming that all Elatives are automatically exceptions to FCSL. Another problem would be that the choice of the I Elative marker for forms with a in a final closed syllable and the choice of U to mark Elatives of primaries with /a/ word-finally would both seem to be completely arbitrary (cf. Sect. 2.3 above).

5.3 This type of transderivational approach to the facts presented in this paper would seem to offer what in my opinion is a rather insightful explanation for the role of phonological opacity in avoiding homonymy in Javanese Elatives. That is, the transderivational approach just described explicitly claims that we are dealing with a case of a language specifically avoiding surface homonymy in Elatives by keeping the derivation of primary adjectives and their corresponding Elatives parallel, so that the primary and derived forms will be as similar to each other as possible at the surface. Although the same ultimate result (i.e. avoidance of homonymy) is obtained by ordering Elative Formation after a number of phonological rules, and even though this result can be cited as justification for the presence of such an ordering in the grammar of Javanese, it seems to me that the explicit claim made by a transderivational analysis about how surface homonymy is to be avoided (i.e. by keeping Elatives as much as possible like their primary forms) is an important insight which is missing from the rule ordering approach.

Because of the enormous power of a device such as the transderivational constraint, and because we as yet know very little about the conditions under which such devices might reasonably be posited for phonology, I am hesitant at this time to make any strong endorsement for a transderivational analysis of Javanese Elatives;<sup>12</sup> I would however suggest that such an analysis be at least considered as an alternative to simple rule ordering.

## FOOTNOTES

1 I have borrowed the term "Elative" from Uhlenbeck (1949). The analysis of Javanese presented in the present paper is based on data I have gathered in the course of a year spent working with my informant Suharto Prawirokusumo, a native speaker of Javanese from Surakarta.

2 By "morphological" I refer to linguistic processes which are responsible for the creation of words which are clearly segmentally related to primary forms, but which differ in some systematic way in grammatical category or semantic import from those primary forms.

3 Although the literature contains numerous analyses where morphological processes are ordered among phonological rules, as was noted in Wilbur (1973), these special orderings usually involve the morphological process of Reduplication and can be eliminated by acceptance of an identity constraint which, Wilbur convincingly argues, exists between the component parts of reduplicated forms.

4 The discussion in this paper will be limited to bisyllabic stems. This is because the vast majority of roots in the language are of this configuration, with only a limited number of exceptions. (In most cases, stems of more than two syllables are either of foreign origin or the result of compounding, and in both of these cases behavior of the linguistic processes we will be discussing is somewhat aberrant.) In general the whole grammar of Javanese appears to be geared towards dealing with bisyllabic stems.

Throughout the paper I use "final" as synonymous with "last" or "rightmost" when referring to the vowels in a given bisyllabic form. Thus I may use the phrase "final vowel" to refer, for example, to the rightmost vowel in either a form of the shape CVCV/ where the vowel in question is really (word) final, or to one of the shape CVCVC/, where the final vowel is not actually word-final. When "word-final" is meant, this will be clearly specified.

5 There is good evidence in the language to indicate that underlying i and u are tense vowels, while a and schwa are lax. The basic character of mid vowels is however somewhat problematic. For the purposes of the present paper I will assume that e and o are underlyingly tense; alternatively they could reasonably be regarded as unspecified for tenseness or laxness, with these features being assigned in the appropriate environments by rule. It seems to me that whichever of these characterizations is chosen, the conclusions reached in the present paper will remain in large part unchanged, with only certain details of the phonological rules included in the analysis being contingent on the choice of mid vowel characterization.

It must also be noted that the phonological rules described

below are only preliminary formulations; further investigation will probably lead to some minor changes. Again however, I am confident that these changes will have no effect on the validity of claims made in the present paper. (For detailed discussion and justification of the analysis presented here, the reader is referred to my forthcoming dissertation.)

6 The English glosses of Javanese words used throughout the paper are from either Horne (1961) or Horne (1974).

7 Although it may appear at first glance that this form represents a violation of Vowel Harmony, this is in reality not the case, since Vowel Harmony specifies that the two vowels to be harmonized must have been identical originally. Surface rOso however comes from /rOsa/, with non-identical basic vowels.

8 In Uhlenbeck (1949) there is a description of Javanese Elatives which differs slightly from that presented here. The main difference lies in the fact that as Uhlenbeck describes it, Elative Formation involves replacement of any vowel in a final syllable ending in ə with schwa. Thus he gives on p. 79 the form tjédəq 'near' with corresponding Elative tjédəq. He at once comments however that this complication in the otherwise simple formation of Elatives seems to be on the way out, with the usual I or U marker appearing more and more frequently in such forms. His prediction seems to be borne out by the fact that my informant has a grammar which has, with only a few exceptions, done away with the complication in question. There is also one other difference between Uhlenbeck's description of Elatives and what I found to be true for my informant: Uhlenbeck claims that primary forms in final /a/ may have Elatives with either I or U as the marker. I found this to be the case only for a very small number of adjectives (e.g. ombo has both ombI and ombU as permissible Elatives), with the U marker clearly being the productive rule for such forms.

9 The language appears to escape confusion in many other cases by what appears to be more or less an accident of distribution. In Javanese (according to Uhlenbeck (1949)) bisyllabic roots with certain vowel configurations are very common, while others are less common and still others are extremely rare. It turns out to be the case that in many instances where a given Elative could theoretically correspond to more than one primary form, one of these forms has a vowel configuration that is at least twice as common as the other, which occurs very rarely. Thus for example, an Elative of the shape CUCUC could conceivably correspond to either of the primary forms CUCuC or CUCoC. However, Uhlenbeck gives the frequency of occurrence of the former type as 356, while the latter type only occurs 35 times. So that, given an Elative like CUCUC, there should in actuality be very little possibility of confusion as to primary forms, with one of the possibilities being very likely to actually occur as a primary adjective, and the other extremely unlikely.

10 The reader may have noted that the Elatives of CECiC and CECaC forms still fall together. This problem is however partially avoided by the distributional statistics mentioned in the previous note, with the frequency of morphemes of the former type being, according to Uhlenbeck, only 26, while the latter occurs 126 times.

11 Forms with /a/ appear to behave slightly differently; this however is really an illusion created by the notation being used. Thus we find o in forms like dowa from /dawa/, where according to the principle suggested above there should be a tense penultimate. It happens to be the case however that /a/ actually appears to have the surface realization o in all environments where other vowels have tense variants, so that o may be thought of as the tense variant of /a/. Thus, theoretically dowa could be written dAwA. However I have chosen to represent the tense variant of /a/ with o because it coincides phonetically with the lax variant of /o/.

12 For discussion of a rather different situation in which a transderivational approach to the avoidance of homonymy is suggested see Kisseberth and Abasheikh (1974).

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# A NOTE ON TONAL CONJUNCTION IN EFIK\*

Chin-W. Kim

There has been some discussion in the recent past on the question of representation of tones. This question was two-pronged. On one hand, there was a question of how to represent tones in distinctive feature notations (cf. Maddieson 1971, Wang 1967, Woo 1969), and on the other, the question of where and how to map tones, a suprasegmental feature, onto segmental matrices (cf. Fromkin 1972, Leben 1971). This short paper is concerned with the latter question. By examining a small amount of tonal data from Efik, a Benue-Congo language spoken in the Calabar district of Nigeria, I will try to argue that rules of tone mapping (tone distribution) would be simpler if one abandons insistence that throughout the tonal derivation, each and every tone must be associated with a syllable or its nucleus vowel. Rather, I will try to show that, at least with respect to the Efik data at hand, tone distribution is simpler and perhaps more natural if tone sequences are permitted during derivation independently of segments of syllables. Tone mapping would be made only at the end of derivation by what I take to be a universal set of conventions for tone distribution.

In the following table (1), the left column lists Efik words representing all the possible tonal patterns in two-syllable Efik nouns in isolation or in utterance-initial position. The middle column shows the tonal change that occurs when these nouns follow an adjective ending in a high tone, represented by àkámá 'large', and the right column shows the change in the tones of nouns following an adjective ending in a low tone, represented here by the word èkpírì 'small'.

	/àkámá _____ 'large' /	èkpírì _____ 'small'
(a) ébót 'goat' [ __ ]	→ [ __ ]	→ [ __ ]
(b) íkwâ 'knife' [ ^ ]	→ [ __ ]	→ [ __ ]
(c) úfòk 'house' [ ^ ]	→ [ __ ]	→ [ __ ]
(d) ùsàn 'dish' [ __ ]	→ [ __ ]	→ [ __ ]

(e) ɪkpáŋ 'spoon' [ _ ]	→ [ _ ]	→ [ _ ]
(f) áwā 'cat' [ _ ]	→ [ _ ]	→ [ _ ]
(g) í!nwén 'bird' [ _ ]	→ [ _ ]	→ [ _ ]

! in (g) is a downstep tone signalling that the following high tone must step down to a slightly lower level in pitch than the preceding high.

In trying to generate the derived tone shapes of the nouns from those of the isolated forms exemplified in (1), I will first give a possible solution within the framework of segmental tonology, and then will present an alternative analysis in which tones are regarded as supra-segmental exponents during the derivation.

If one temporarily labels ^ as a falling tone, the first six nouns in (1) represent the following tonal patterns: (a) High-High, (b) High-Fall, (c) High-Low, (d) Low-Low, (e) Low-High, (f) Low-Fall. The tone in (g) cannot be expressed with a sequence of two terms from High, Low, or Fall. All possible two-term combinations beginning with either High or Low of these three have been exhausted by the tone patterns from (a) to (f), and the tone (g) cannot be equated with any of the above. One can note however that a tone pattern beginning with a Fall is singularly missing from the above list. Suppose now that the initial High tone and the following downstep ! in (g) is collectively rewritten as a Fall, i.e., í!nwén = ínwén. With this temporary rewriting of the tone pattern in nouns of the type (g), one can note the following two generalizations in the tonal change in (1):

(2) Regardless of the type of tone, the initial syllable of the noun takes the tone of the last syllable of the preceding adjective;

(3) When the initial syllable of the noun has a High tone, the tone of the second syllable changes to Low regardless of its original tone (a - c).

These two steps will derive correctly the forms in (a) to (d), but will be unable to derive those in (e) to (g), as the following derivations in the environment of a high-tone ending adjective show:

(4)	via (2)	(3)
(e) ɪkpáŋ	→ ɪkpáŋ	→ ɪkpáŋ * [ _ ]
(f) áwā	→ áwā	→ áwā * [ _ ]
(g) ínwén	→ ínwén	→ ínwén * [ _ ]

Since rule (2) directly "feeds" rule (3) turning every noun into HL [ - ], one may reverse the relative ordering and try (3) - (2):

(5) (3) (2) correct form

(e) ikpáŋ NA → ikpáŋ \* [ - ] [ - ]

(f) áwā NA → áwā \* [ - ] [ - ]

(g) ínwén NA → ínwén \* [ - ] [ - ]

(3) is not applicable, and (2) assigns a High tone on the first syllable after another High. As is seen, neither ordering generates the correct tones for (e) - (g). When one compares the correct forms with the incorrect forms generated in (5), it becomes apparent that the downstep tone in the second syllable is the difference between the two sets, i.e., the second tone in the correct forms is down-stepped, while it is not in the incorrect forms. Since we know that, diachronically and synchronically, the downstep tone results from a preceding low tone, and since a low tone in fact exists in the first syllable in the isolated forms of nouns of the type (e) - (g), we may want to somehow preserve this low tone (which would later trigger the downstepping of the following high tone) when the first syllable copies the last tone of the preceding adjective. This can be done by assigning on the first syllable of nouns a sequence of HL (= Fall), where H is the last tone of the preceding adjective and L the original tone of the first syllable of a disyllabic noun. Thus:

(6)  $V \rightarrow \widehat{HL} / H ] A \text{ \_\_\_\_\_}$

This rule applies vacuously to nouns of the form ínwén since it already has a sequence of  $\widehat{HL}$  in the first syllable. The initial H of  $\widehat{HL}$  assigned by rule (6) is a tone copied from the preceding H, and therefore, one should assign  $\widehat{L}$  if the preceding tone is L (and if the original tone of the noun is also L). We rewrite rule (6) to reflect this:

(7)  $V \rightarrow \widehat{HL} / \widehat{H} ] A \text{ \_\_\_\_\_}$ , (where  $\widehat{H} = L$ )

This rule (7) can now replace rule (2). The superfluous L that rule (7) assigns even when the second tone of noun is L can be taken care of by deleting it after the L downsteps the following H. It should be noted that this L tone deletion is not an extra ("patch-up") rule that is motivated solely to delete a totally unnecessary L that has been assigned by rule (7). This is so, because this L that downsteps the following H

will have to be deleted in any case, and therefore the deletion of L before another L and the deletion of L after having triggered a downstep in the following H can be coalesced into one single rule of low tone deletion. We now have the following sequence of rules:

(8) i)  $V \rightarrow -H / H \text{ \_\_\_\_\_\_ } ]_N \text{ NP}$  = (3)

ii)  $V \rightarrow \{H-H / \alpha H\} ]_A \text{ NP}$  = (7)

iii) Downstep:  $H \rightarrow !H / -H \text{ \_\_\_\_\_\_ }$

iv) L-deletion:  $-H \rightarrow \emptyset / \text{ \_\_\_\_\_\_ } !H$

In (9) is given a step-by-step derivation of the seven tone types of disyllabic nouns after both adjective ending in a high tone and an adjective ending in a low tone according to the order of rules as given in (8).

(9A) /H	via (8 i	ii	iii	iv)
a. ébót	→ ébôt	→ èbôt		→ ébôt [ ' _ ]
b. íkwâ	→ íkwâ	→ íkwâ		→ íkwâ [ ' _ ]
c. úfðk		→ úfðk		→ úfðk [ ' _ ]
d. ùsàn		→ ùsàn		→ ùsàn [ ' _ ]
e. íkpán		→ íkpán	→ íkp!an	→ íkp!an [ ' - ]
f. àwâ		→ àwâ	→ àw!à	→ àw!à [ _ ' ]
g. ínwen			→ ínw!en	→ ínw!en [ - ' ]

(9B) /L				
a. ébót	→ ébôt	→ èbôt		→ èbôt [ _ _ ]
b. íkwâ	→ íkwâ	→ íkwâ		→ íkwâ [ - - ]
c. úfðk		→ úfðk		→ úfðk [ _ _ ]
d. ùsàn		→ ùsàn		→ ùsàn [ _ _ ]
e. íkpán		→ íkpán	→ íkp!pan	→ íkp!an [ - - ]
f. àwâ		→ àwâ	→ àw!à	→ àw!à [ _ ' ]
g. ínwen		→ ínwen	→ ínw!en	→ ínw!en [ - ' ]

The above sequences are roughly how Boys (1971) derives the surface tones of disyllabic nouns in  $[A + N]_{NP}$  construction in Efik.

In the following, I will propose an alternative way to derive the surface tones of Efik nouns, and will claim that not only is my proposal more natural but also it is in fact a correct one when one brings in an additional amount of data, in particular, polysyllabic nouns and longer noun phrases.

As was mentioned at the beginning of this paper, my proposal crucially depends on the assumption that in the intermediate stages of tonal derivation, tones should be disassociated from segments or syllables. I will make a claim that the final tone sequences can be obtained by mapping tones onto the syllables at the end of the derivations according to a set of conventions of tone distribution.

Eight steps or rules that are needed for my derivation are as follows:

- (10) i) Assignment of L at the end of all H tone nouns.
- ii) Tone spreading: the final tone of adjective spreads to the right.
- iii) Downstep:  $H \rightarrow h / L \text{ \_\_\_}$  (where h is a downstepped H)
- iv) L-deletion:  $L \rightarrow \emptyset / \text{ \_\_\_ } h$
- v) Tone convention:  $hL \rightarrow f / X \text{ \_\_\_}$  (where f is a downstepped Fall and X is not a word boundary)
- vi) H-adjustment:  $H \rightarrow h / h \text{ \_\_\_}$  (i.e., an H following an h becomes an h)
- vii) Tone contraction: A sequence of the same tones are contracted to one.
- viii) h-adjustment:  $h \rightarrow L / \# \text{ \_\_\_}$  (i.e., initial h becomes L, presumably because h cannot begin a word. I cannot explain however why h cannot become H here instead.)

The following is a step-by-step derivations of the tone patterns in (1) according to the steps given in (10).

## (11A) After an adjective ending in H:

via (10)	i	ii	iii	iv	v	vi	vii	viii	Final tone
a. ébót HH	HHL	HHHL					HL		HL [ - ]
b. íkwâ HHL		HHHL					HL		HL [ - ]
c. úfðk HL		HHL					HL		HL [ - ]
d. ùsàn LL		HLL					HL		HL [ - ]
e. ìkpán LH		HLH	HLh	Hh					Hh [ - ]
f. àwâ LHL		HLHL	HLhL	HhL	Hf				Hf [ - ]
g. ínwén HLH		HHLH	HHLh	HHh			Hh		Hh [ - ]

## (11B) After an adjective ending in L:

via (10)	i	ii	iii	iv	v	vi	vii	viii	Final tone
a. ébót HH	HHL	LHHL	LhHL	nHL		hhL	hL	LL	LL [ - ]
b. íkwâ HHL		LHHL	LhHL	hHL		hhL	hL	LL	LL [ - ]
c. úfðk HL		LHL	LhL	hL				LL	LL [ - ]
d. ùsàn LL		LLL					L		LL [ - ]
e. ìkpán LH		LLH	LLh	Lh					Lh [ - ]
f. àwâ LHL		LLHL	LLhL	LhL	Lf				Lf [ - ]
g. ínwén HLH		LHLH	LhLh	hh				Lh	Lh [ - ]

The above derivations show that the eight steps described in (10) derive the correct output for all forms given in (1). On the surface, it appears that there is no a priori reason why derivations via (10) are better than those by (8). If anything, the steps in (10) are twice as long as those in (8), and one may argue with reason that a description in less number of rules is in some sense better than the one with a more number of rules. This however presupposes the condition of ceteris paribus. In the case of (8) and (10), the principles of derivation are different, and the number of rules cannot be the sole criterion of the respective merit. Furthermore, in (10), rules like a low-tone deletion after

down-stepping, a contraction of HL to a fall, adjusting the pitch level of H to the preceding h, rewriting a sequence of the same tones as a single formula, etc. are merely automatic adjustments or conventions, and should not be regarded as language-specific rules.

As had already been mentioned, I am adopting here a principle of derivation that permits a generation of tone sequences independently of segments or syllables during derivations. Not only will this avoid awkward intermediate forms as in (9B) where two low tones are assigned to a single vowel (only to delete one later), but also it can distribute tones to polysyllabic forms by a generalized formula without having to resort to a separate set of rules different from the one for disyllabic nouns. McCawley (1970) observed that tones in conjugations of tenses in Tiv verbs can be simplified and generalized precisely in this way. He could write concise formulae for most tone patterns of the twelve tense aspects in Tiv irrespective of the number of syllables in verb stems. For a schematic example, a formula  $H_0L$ , where  $H_0$  is any number of high tones, will assign HL (fall) to a monosyllabic verb, HL to a disyllabic verb, HHL to a trisyllabic verb, etc. In a different vein, Williams (cited in Maxwell 1972) argues for a lexical representation of tone in Margi, citing examples like fí (a verbal stem) + -ani (a toneless suffix) + fyàní; tlà + wá + tlwá. Unless the lexical tone LH is disassociated from syllables and is mapped to the suffixed form after some segmental rules, e.g., devocalization of i to v, w deletion, vowel contraction, etc., have applied, it is at best cumbersome to write rules of tone shift in such cases as these if tones are to be segmental properties at all times. Stahlke (in personal communication) also favors lexical approach to tonal analysis in languages like Hausa, Igbo, and Mende. He points out that in these languages polysyllabic words do not display all mathematically possible tone combinations, and that labelling a lexical item as a L tone word, an H tone word, or an HL word, without any specific segmental requirements, appears to capture the relation between tone and segments in a simpler way. For example, in Hausa, the plural of kafa (HH, 'leg') is kafafu (HLH), where a best description seems to be to say that HH nouns have a plural tone pattern HLH, dispensing with the need to explain the tonal change in the second syllable fa. (For a detailed discussion of this example, see Maxwell 1972.) In Mende, a

trissyllabic word felema 'junction' has a tone sequence HML, although there is no phonemic mid tone in Mende. Again this can be best explained by labelling the word as a falling tone word. Such a lexical tone would manifest as a single falling tone in a monosyllabic word, as a sequence of HL in a disyllabic word, and as a sequence of HML in a trissyllabic word.

What I am arguing here is that tonal conjunction in Efik noun phrase constructions can best be described suprasegmentally. As is often the case in such claims, validity of the description can be tested on new data. I will examine two cases, one involving a polysyllabic noun, and the other, a larger complex noun phrase.

For a polysyllabic noun, ndísé 'a picture' will serve as a representative example. This all high tone trissyllabic noun has the following surface tones when combined with an adjective:

(12) akámbá ndísé (... HLL) 'a large picture'

èkpírì ndísé (... LLL) 'a small picture'

If we follow the steps given in (8), we will get either (13A) or (13B)

(13A) akámbá ndísé                      èkpírì ndísé  
                     H H H                                      H H H

8a:            H L H                                      H L H

8b:            HLL H                                      LLL H

8c:            HLL h                                      LLL h

8d:            H L h                                      L L h

                    \* [ - - ]                                      \* [ - - ]

(13B) akámbá ndísé                      èkpírì ndísé  
                     H H H                                      H H H

8a:            H H L                                      H H L

8b:            HLH L                                      LLH L

8c:            HLh L                                      LLh L

8d:            H h L                                      L h L

                    \* [ - - ]                                      \* [ - - ]

As can be seen, the final output derived by (8) is incorrect in all cases, the correct form being HLL [ - - ] following an adjective ending in a high tone and LLL [ - - ] following an adjective ending in a low tone.



Application of the steps given in (10), however, will derive the correct surface tones. Derivation is exactly the same as given in (11Aa) and (11Ba). ndísé being a trisyllabic noun, there is of course one more H throughout the derivation, but tone contraction (10viii) will reduce the tone sequence to give the same final output. If we formulate that high tone nouns regardless of its number of syllables will have the tone shape  $HL_1$  following a high tone, and  $L_1$  following a low tone (where  $L_1$  is to be read 'one or more'), then a disyllabic high tone noun will have the tone shape HL, and a trisyllabic high tone noun, HLL, after a high tone. Both nouns will bear low tones throughout after a low tone. This formula corolarily predicts that a monosyllabic high tone noun will have HL (= fall) and a quadri-syllabic high tone noun, HLLL, etc., following an adjective ending in a high tone. If this prediction turns out to be correct, then a correct generalization will have been captured, but this generalization will not be possible unless one disassociates tones from segments and syllables during derivations. I have shown here that the prediction is true to the extent of bi- and trisyllabic nouns.

- (14)            ákámhá    ébót    ówó    órò 'that man's big goat'  
                   'big'    'goat'    'man'    'that'

Isolated: / L H H    H H    H H    H L /

Surface: [ L H H    H L    L L    L L ]

In order to derive the surface tones from the isolated tones, I will assume the following:

- i) The constituent structure of the string (14) is:

$$(15) \left[ \begin{array}{c} \text{NP} \\ \left[ \begin{array}{c} \text{NP} \\ \left[ \begin{array}{c} \text{A} \\ \text{akamba} \end{array} \right] \end{array} \right] \text{A} \left[ \begin{array}{c} \text{N} \\ \text{ebot} \end{array} \right] \text{N} \end{array} \right] \text{NP} \left[ \begin{array}{c} \text{NP} \\ \left[ \begin{array}{c} \text{N} \\ \text{owo} \end{array} \right] \text{N} \left[ \begin{array}{c} \text{D} \\ \text{oro} \end{array} \right] \text{D} \end{array} \right] \text{NP} \end{array} \right] \text{NP}$$

- ii) Tonal sandhi in A + N type noun-phrase construction also operates in NPs of N + Det type as well as  $[\text{NP} + \text{NP}]_{\text{NP}}$ .

- iii) Tone rules operate in cycles in such a way as was described in Chomsky and Halle (1968), i.e., outward from the innermost constituent erasing brackets at the end of each cycle.

With these assumptions, the derivations are as follows:

$$(16) \quad \begin{array}{cccc} \text{ákámhá} & \text{ébót} & \text{ówó} & \text{órò} \\ \text{L H H} & \text{H H} & \text{H H} & \text{H L} \\ \underline{\text{L H H}} & \underline{\text{H L}} & \underline{\text{H H}} & \underline{\text{H L}} & \text{1st cycle} \\ \underline{\text{L H H}} & \underline{\text{H L}} & \underline{\text{L L}} & \underline{\text{L L}} & \text{2nd cycle} \end{array}$$

That is, in the first cycle, a high-tone noun éboť becomes HL, following an adjective ending in a high tone, according to the formula  $HL_1$ . The second noun phrase ówó órò remains unchanged. In the second cycle, since the first constituent now ends in a low tone, the second constituent ówó órò follows the formula  $L_1$ , and all H's are converted to L's, generating the correct final tone shape. The surface tone [LLLL] for owo oro (originally HHHL) would be inexplicable and underivable unless one adopts the principle of a transformational cycle and the principle of suprasegmental tone derivation, for if one applies rules in (8) to the string (14), one will obtain for owo oro incorrect surface tones of either \*[HhhL] or \*[LhhL] instead of the correct [LLLL].

I have argued in this paper for a suprasegmental representation of tone in Efik, in particular, in noun-phrase constructions. Such a representation is of course assumed to be required only during an early stage of phonological derivations. Since tones have to be phonated in actual pitch eventually using segments as vehicles, and since certain tonal phenomena are solely determined by segmental properties\*\*, there is no question that tones will have to be mapped onto segments at some point in derivation. This raises some unresolved questions. For instance, is there a natural point in the course of derivation at which suprasegmental tones become segmental? What is the exact nature of this tone mapping? Is it arbitrary and language-specific or is it universally specifiable? Is it necessary for all tone languages to have suprasegmental tone representation? That is, are there tone languages in which the mapping of suprasegmental tone onto segmental matrices occurs at the beginning of the phonological derivations, thus making the whole exercise pointless?

#### NOTES

\*An earlier version of this paper was given at the 4th Annual Conference in African Linguistics, April 1973, Queen's College, New York.

\*\*In Nupe, for example, a voiceless consonant intervening between two vowels preserves level tones on these vowels, while a voiced consonant gives rise to a rising tone on the second, thus: étú [ \_ ] 'parasite' vs. èdú [ \_ ] 'taxes' (cited in Fromkin 1972:63 as from George 1970), presumably because a voiced consonant does not interrupt a continuous phonation of pitch. In general, the pitch tends to rise in the environment of a voiceless consonant, while it tends to be lowered in the voiced environment.

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THE PERFECT STEM IN CHI-MWI:NI\*

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In this paper we examine in some detail the morphophonemic principles underlying the construction of what Bantu scholars generally refer to as the "perfect stem" in Chi-Mwi:ni, a Bantu language spoken in the city of Brava (the indigenous name of which is Mwi:ni) in Somalia. We restrict ourselves to a consideration of perfect stems involving the addition of a suffix; a subsequent paper will examine cases where the perfect stem is constructed by means of a change in the quality and/or quantity of the last vowel of the non-perfect stem. Furthermore, not all instances of suffixed perfect stems are dealt with here. We postpone until later the analysis of (1) the construction of a perfect stem from the so-called "applied" or "prepositional" stem, and (2) the shape of the perfect stem when it is passivized. The analytical problems offered by these two formations are of considerable interest and thus merit separate treatment.

Chi-Mwi:ni has been referred to as a "dialect" of Swahili,<sup>1</sup> forming the northernmost link of a chain of dialects that extends along the East African coast. Whether this label is appropriate is a debatable point, but in any case Chi-Mwi:ni is highly divergent from the more familiar forms of Swahili, and the phonological problems that we will be concerned with have no parallels in standard Swahili. Indeed, a suffixed perfect stem is not currently employed in Swahili. That data presented here is based entirely on the speech of Mohammad Imam Abasheikh, a graduate student in the Department of Linguistics of the University of Illinois, and is the result of a collaborative effort between him and the present writer [C.W.K.] that was initiated in June 1973.

We take the perfect suffix to be underlyingly -i(:)ɿ- (see below for a discussion of the quantity of the suffixal vowel), where ɿ stands for a liquid that is phonemically distinct from both l and r. Preliminary instrumental investigation suggests that in the articulation of ɿ, the tip of the tongue strikes lightly against a small area to the front of the

alveolar ridge without any lateral contact. The area of contact in the case of *l*, on the other hand, is larger, and there is lateral contact. The duration of *l* is longer than the duration of *ɭ*. Although phonemically distinct, the contrast between *ɭ* and *l* is merged in favor of *l* in a number of contexts.

Some examples where the perfect suffix shows up with its basic shape intact phonetically are given below in (1):<sup>2</sup>

- |                                    |                                  |
|------------------------------------|----------------------------------|
| (1) <i>jib-i:ɭ-e</i> 'he answered' | cf. <i>ku-ji:b-a</i> 'to answer' |
| <i>sif-i:ɭ-e</i> 'he praised'      | <i>x-si:f-a</i>                  |
| <i>ɭum-i:ɭ-e</i> 'he bit'          | <i>ku-ɭum-a</i>                  |
| <i>i-vuy-i:ɭ-e</i> 'it leaked'     | <i>ku-vu:y-a</i>                 |
| <i>taraj-i:ɭ-e</i> 'he hoped'      | <i>x-taraj-a</i>                 |
| <i>had-i:ɭ-e</i> 'he said'         | <i>ku-had-a</i>                  |

We have separated the final *-e* in the above forms from the perfect suffix *-i(:)ɭ-* and consider it to be a separate morphological element. One motivation for doing so is that this final vowel *-e* is not a constant feature of perfect forms, whereas *-i(:)ɭ-* is. For example, the *-e* is replaced by *-a* in passive forms and by *-o* in relative forms. Thus if *-ji:b-* is passivized, its perfect form will be *jib-i:l-a* (the shift of *ɭ* to *l* is a feature of the passive construction, and is not dealt with here); if *-ji:b-* is functioning as the main verb of a relative clause, it will have the perfect form *jib-i:ɭ-o*.

The suffix *-i(:)ɭ-* undergoes various alternations, as well as conditioning alternations in the preceding stem. We will begin our examination of the formation of the perfect stem by considering changes involving the segmental structure of the perfect suffix itself. The quality of the suffixal vowel is subject to a systematic alternation: it is a high vowel just in case the preceding vowel in the word is *i*, *a*, or *u* (long or short), but a mid vowel if the preceding vowel is *e* or *o* (long or short). In (1) we gave examples where the verb stem has *i*, *a*, or *u* as the last vowel, thus requiring a high vowel in the perfect suffix. In (2) examples are given of stems whose last vowel is *e* or *o*, thus requiring the appearance of *e* rather than *i* in the suffix.

- (2) tov-e:ɪ-e 'he dipped' cf. x-tov-a 'to dip'  
 som-e:ɪ-e 'he read' x-so:m-a  
 gorom-e:ɪ-e 'he roared' ku-goro:m-a  
 heshm-e:ɪ-e 'he respected' ku-heshm-a  
 reb-e:ɪ-e 'he stopped' ku-re:b-a  
 tetem-e:ɪ-e 'he shivered' x-tetem-a

We have assumed that the vowel of the perfect suffix is i underlyingly and becomes e when preceded by e or o by virtue of a rule of Vowel Harmony. The alternative to this analysis would be to consider the vowel of the perfect suffix to be e underlyingly, and have it raised to i when preceded by i, a, or u. We have preferred the former solution on the grounds that it is phonetically more plausible that a high vowel should become mid if preceded by a mid vowel than that a mid vowel should become high if preceded by either a high vowel or a low vowel. The proposed rule of Vowel Harmony operates in additional contexts in Chi-Mwi:ni and is not a feature of the language that is peculiar to the perfect stem. We note its operation here simply because its effects are observable in many of the examples cited below.

The ɪ of the perfect suffix undergoes two separate changes. After a stem ending in l, ɪ, or r, it changes to l. Note the examples in (3):

- (3) sul-i:l-e 'he wanted' cf. x-su:l-a 'to want'  
 komel-e:l-e 'he locked' x-komel-a  
 owel-e:l-e 'he swam' k-o:wel-a  
 fadiɪ-i:l-e 'he preferred' x-fadiɪ-a  
 sajiɪ-i:l-e 'he recorded' x-sajiɪ-a  
 gulguɪ-i:l-e 'he threatened' ku-gulgu:ɪ-a  
 gir-i:l-e 'he moved' ku-gu:r-a  
 jasir-i:l-e 'he dared' ku-ja:sir-a  
 mer-e:l-e 'he turned about' ku-me:r-a

This change of ɪ to l after liquid-final stems -- call the process Lateralization -- also affects the "applied" suffix -iɪ-, which is the only other suffix containing the consonant ɪ. Lateralization must be restricted to ɪ in suffixes, for a root ɪ is permitted to appear after a liquid. Note the following examples:

ku-la:l-a 'to sleep', ku-le:l-a 'to be loose', le:lo 'today',  
 ku-lo:l-a 'to take a wife', li-le 'tall', ku-la:l-a 'to be sick'.

After stems ending in s, z, sh, or ñ, the l of the perfect suffix changes to z, as the data in (4) show.

(4) kos-e:z-e 'he made a mistake'	cf. x-koš-a 'to make a mistake'
fi <u>li</u> s-i:z-e 'he went bankrupt'	x-fi <u>li</u> s-a
to <u>ko</u> s-e:z-e 'he boiled'	x-t <u>co</u> kos-a
an <u>z</u> -i:z-e 'he began'	k-a:n <u>z</u> -a
<u>te</u> z-e:z-e 'he played'	x- <u>te</u> z-a
<u>tu</u> nz-i:z-e 'he looked stealthily'	x-tu- <u>nz</u> -a
ra <u>sh</u> -i:z-e 'he followed'	ku-ra:sh-a
a <u>sh</u> -i:z-e 'he lit a fire'	k-a:sh-a
<u>to</u> sh-e:z-e 'he thought'	x- <u>to</u> sh-a
fa <u>ñ</u> -i:z-e 'he did'	x-fa:ñ-a
ka <u>ka</u> ñ-i:z-e 'he changed'	x-ka <u>ka</u> ñ-a
ta <u>ta</u> ñ-i:z-e 'he created discord'	x-ta <u>ta</u> ñ-a

This particular change is limited to the l of the perfect suffix; it does not affect the l of the applied suffix, nor does it affect a l in a root. Note the following examples of root l where it is retained after s, z, sh, and ñ: x-so:l-a 'to crush grain by pounding', ku-za:l-a 'to bear (children, e.g.)', ku-ña:l-a 'to collapse', shalabe:la 'haphazardly'.

The two changes in the consonant of the perfect suffix described above are highly regular: so far in our investigation no exceptions to the change of l to l after stems ending in a liquid have been found, and just three or four to the change of l to z after stem-final s, z, sh, and n (bariz-i:l-e 'he attended a meeting', jasus-i:l-e 'he spied', asis-i:l-e 'he founded an organization').

We turn now to changes in the final consonant of stems when they precede the perfect suffix. The consonants of Chi-Mwi:ni may be divided into two categories by virtue of their behavior before the perfect suffix: the Immutable and the Mutable consonants. The members of these two groups are listed below:



- (I) The Immutable consonants: (a) nasal consonants  
 (b) l, r -- but not ɫ  
 (c) voiced stops if not preceded by a nasal  
 (d) continuant obstruents  
 (e) "glides"
- (II) The Mutable consonants: (a) voiceless stops  
 (b) voiced stops if preceded by a nasal  
 (c) ɫ

As should be clear from our terminology, the Immutable consonants are those which undergo no alternation when they precede -i(:)ɫ-. Immutable consonants are exemplified in full in (5):

(5) Immutables of type (a):

som-e:ɫ-e 'he read'	cf. x-so:m-a 'to read'
ɫim-i:ɫ-e 'he cultivated'	ku-ɫim-a
amin-i:ɫ-e 'he believed'	k-a:min-a
kun-i:ɫ-e 'he scratched'	x-kun-a
awañ-i:z-e 'he divided'	k-a:wañ-a
fañ-i:z-e 'he did'	x-fa:ñ-a

Immutables of type (b): cf. (3)

Immutables of type (c):

jarib-i:ɫ-e 'he tried'	ku-ja:rib-a 'to try'
dhib-i:ɫ-e 'he bothered'	ku-dhib-a
rud-i:ɫ-e 'he returned'	ku-ru:d-a
dod-e:ɫ-e 'he complained'	ku-do:d-a
taraj-i:ɫ-e 'he hoped'	x-taraj-a
i-jaj-i:ɫ-e 'it itched'	ku-ja:j-a
tig-i:ɫ-e 'he castrated'	x-tig-a
rag-i:ɫ-e 'he was late'	ku-ra:g-a

Immutables of type (d):

gaf-i:ɫ-e 'he made a mistake'	ku-gaf-a 'to make a mistake'
tuf-i:ɫ-e 'he spit'	x-tuf-a
tov-e:ɫ-e 'he dipped'	x-tov-a
koð-e:ɫ-e 'he talked'	x-ko:d-a

kas-i:z-e 'he heard'	x-kas-a
tez-e:z-e 'he played'	x-tez-a
barsh-i:z-e 'he taught'	ku-barsh-a
dhaxax-i:z-e 'he moved'	ku-dhaxa:x-a

Immutables of type (e):

duguw-i:z-e 'he limped'	ku-duguw-a 'to limp'
olow-e:z-e 'he got wet'	k-o:low-a
i-vuy-i:z-e 'it trickled'	ku-vu:y-a
tiy-i:z-e 'he feared'	x-tiy-a
sameh-e:z-e 'he forgave'	x-sa:meh-a
xada'-i:z-e 'he cheated s.o.'	xada'-a

The Mutable consonants, on the other hand, are those that undergo a mutation before the perfect suffix -i(:)z-. The result of this mutation is always a coronal continuant obstruent. In the case of the voiceless stops, p, t, and k all change to s, whereas k changes to sh. (It should be pointed out that there are very few stems ending in p, and thus the change of p to s is only marginally attested.) In the case of post-nasal voiced stops, b, d, and g all change to z. Similarly, z changes to s. Examples:

(6) Mutable consonants of type (a):<sup>3</sup>

las-il-e 'he swore an oath'	cf. ku-lap-a 'to swear (an oath)'
lis-il-e 'he paid'	ku-lip-a
gi:s-il-e 'he pulled'	ku-gi:t-a
kus-il-e 'he folded'	x-kut-a
las-il-e 'he let go'	ku-lat-a
lo:s-el-e 'he dreamed'	ku-lo:t-a
le:s-el-e 'he brought'	ku-le:t-a
pis-il-e 'he passed'	x-pit-a
pish-il-e 'he cooked'	x-pik-a
tesh-ele 'he laughed'	x-tek-a
shi:sh-il-e 'he held'	x-shi:k-a

Mutable consonants of type (b):

lo:nz-el-e 'he begged'	ku-lo:mb-a 'to beg'
tu:nz-il-e 'he made a hole'	x-tu:mb-a
ya:nz-il-e 'he farted'	ku-ya:mb-a

ti:nz-iɪ-e 'he cut'	x-ti:nd-a
pe:nz-eɪ-e 'he liked'	x-pe:nd-a
so:nz-eɪ-e 'he sucked'	x-so:nd-a
po:nz-eɪ-e 'he pounded'	x-po:nd-a
shi:nz-iɪ-e 'he won'	x-shi:nd-a
ka:nz-iɪ-e 'he kneaded'	x-ka:nd-a
fu:nz-iɪ-e 'he closed'	x-fu:ŋg-a
kaɪa:nz-iɪ-e 'he fried'	x-kaɪa:ŋg-a
te:nz-eɪ-e 'he moved away'	x-te:ŋg-a

Mutable consonants of type (c):

mo:z-eɪ-e 'he shaved'	ku-mo:i-a 'to shave'
paz-iɪ-e 'he scraped'	x-paɪ-a
pe:z-eɪ-e 'he swept'	x-pe:i-a
kuz-iɪ-e 'he grew'	x-kuɪ-a

(The reader will recall that examples were given in (3) showing that stem-final *ɪ*, like *l* and *r*, causes a change of the *ɪ* of the perfect suffix to *l* -- cf. *fadiɪ:l-i:l-e* 'he preferred'. Stems such as *-fadiɪ-* must be considered exceptions to the mutation of stem-final *ɪ* to *z*. There are in fact a fair number of such exceptions, all loan-words from Arabic or Somali.)

We will refer to the process whereby stem-final mutable consonants alternate before the perfect suffix as Mutation. The first thing that must be noted about mutation is that the coronal continuant obstruents *s*, *z*, and *sh* which arise from this rule do not condition a change in the *ɪ* of the perfect suffix, whereas an underlying *s*, *z*, *sh* or *ɲ* causes this *ɪ* to change to *z* (cf. (4) above). Within the standard generative approach to phonology, this fact would be accounted for by ordering the rules so that the *ɪ*-to-*z* rule is applied prior to Mutation. The derivation of *shi:sh-iɪ-e* as opposed to *rash-i:z-e* is given in (7):

(7) shi:k-i:ɪ-e	ra:sh-i:ɪ-e	
inapplicable	ra:sh-i:z-e	<i>ɪ</i> -to- <i>z</i>
shi:sh-i:ɪ-e	inapplicable	Mutation
shi:sh-iɪ-e	rash-i:z-e	other rules

Notice that Mutation potentially feeds the *i*-to-*z* rule since it creates new instances of *s*, *z*, and *sh*, all of which potentially condition the change of *i* to *z* in the perfect suffix. In the derivations in (7), however, *i*-to-*z* applies before Mutation -- an instance of a "counter-feeding" order of application of rules.

There are, of course, alternatives to the rule ordering description of these data. If the device of global rules is allowed in phonology (for some discussion, see Kenstowicz and Kisseberth (1970) and Kisseberth (1973a, b)), we would simply restrict the *i*-to-*z* rule so that it applies only after underlying stem-final *s*, *z*, *sh*, and *ñ*. The *i*-to-*z* rule then will not be able to apply in a case like *shi:sh-i-i-e*, since the *i* of the perfect is not here preceded by a *sh* that is present in underlying structure. The global rule approach simply places an additional (global) constraint on the *i*-to-*z* rule, rather than applying the *i*-to-*z* rule in any particular order relative to Mutation. The rule ordering solution and the global rule solution in any case make the same basic claim, which appears to be correct: namely, it is the underlying form of the verb stem that determines the shape of the perfect suffix, not the surface shape.

The reader will have noticed that there is considerable variation in the examples cited with respect to the length of vowels. Chi-Mwi:ni is subject to an extensive set of vowel lengthening and vowel shortening processes, a complete description of which is well beyond the scope of this paper. Goodman (1967) and Kisseberth and Abasheikh (1974) provide a description of some of the main features of these processes. The formation of the perfect stem, however, presents certain problems of vowel length variation that are over and above the general patterns of alternation. In particular, the vowel of the perfect suffix exemplifies a pattern of morphophonemic alternation unattested elsewhere in the language. The remainder of this paper will focus on this unique pattern. (We will not be concerned here with variations in the length of vowels in the verb stem to which the perfect suffix is added -- e.g., *x-so:m-a* 'to read', but *so-m-e:i-e* 'he read' -- since such variations can be predicted in terms of generally motivated rules, provided that the correct length has been assigned to the vowel of the perfect suffix prior to the application of the general rules.)

What determines whether the vowel of -i(:)i- will be long, as in jib-i:i-e, or short, as in shi:sh-i:i-e (note that the verb roots in both cases have an underlying long vowel: /ji:b/ and /shi:k/)? An examination of the data presented so far reveals a regularity of a fairly obvious sort: in (5), where the verb stem ends in an Immutable consonant underlyingly, the vowel of the perfect suffix is always long, while in (6), where the preceding verb stem ends in a Mutable consonant, the vowel of the perfect suffix is always short. This observation suggests that the length of the vowel of -i(:)i- might be correlated with the nature of the underlying final stem consonant -- in particular, correlated with the mutability of that consonant. For example, if we assumed that the vowel of the perfect suffix is underlyingly long, we would have a rule that said: shorten the i: of the perfect suffix after a Mutable consonant (i.e. voiceless stops, voiced stops if after a nasal, i). Alternatively, if we claimed that the vowel is short underlyingly, we would have a rule that said: lengthen the i of the perfect suffix after Immutable consonants (i.e. voiced stops not preceded by a nasal, continuant obstruents, sonorants, glides). Given either of these analyses, what is being claimed is that the length of the vowel of the perfect suffix is determined by the nature of the final consonant of the preceding stem prior to Mutation. Recall that Mutation has the effect of changing a Mutable consonant into s, z, or sh -- all of which are themselves in the Immutable class. Thus if it were correct that the length of the perfect suffix correlated with whether the preceding stem ends underlyingly in a Mutable consonant or not, then it would be necessary to apply the rule determining the vowel length of -i(:)i- prior to Mutation (or else appeal to global rules).

There is evidence, however, to show that the length of the vowel of the perfect suffix is not in fact correlated with the contrast between Mutable and Immutable consonants, and thus that the determination of the length cannot be made on the basis of the structure prior to Mutation. This evidence is provided by two types of exceptions to Mutation. The first type involves instances of "negative" exceptions to Mutation -- i.e. cases where the rule should apply, but does not. Exceptions of this type are well-documented in many languages. (8) lists many of the negative

exceptions to Mutation that we have so far discovered. Most of the exceptions are either loanwords or stems ending in a nasal plus a voiced stop (in the latter cases, avoidance of homonyms may be involved in some of the cases of exceptional behavior).

- (8) pamb-i:i-e 'he decorated' (The expected form is pa:nz-il-e, which does occur, but only as the perfect form of -pa:nd- 'to climb, go up'.)

imb-i:i-e 'he sang' (The expected form is inz-il-e, which does occur as an alternative to imb-i:i-e.)

ond-e:i-e 'he tasted'

gog-e:i-e 'he knocked'

song-e:i-e 'he moved close' (The expected form is so:nz-el-e, which does occur, but only as the perfect form of -so:nd- 'to suck'.)

teng-e:i-e 'he stayed away, avoided' (The expected form te:nz-el-e does occur as an alternative form.)

tap-i:i-e 'he tossed around'

xat-i:i-e 'he went without (food, e.g.)'

i-θibit-i:i-e 'it was certain'

set-e:i-e 'he stamped on'

ishtak-i:i-e 'he complained'

tadaruk-i:i-e 'he attended to the needs of his guests'

jadi-i:i-e 'he argued pointlessly' (Cf. (3) above for other examples where stem-final i fails to undergo Mutation.)

Observe that in the above examples, a stem ending in a Mutable consonant fails, exceptionally, to actually mutate. Now, if the length of -i(:)i- were in fact dependent on the contrast Mutable vs. Immutable, then the vowel should have the same length in the examples in (8) as it does in (6); in both cases the vowel is preceded by a Mutable consonant. But whereas the suffixal vowel is short in the examples in (6), it is long in the examples in (8). In other words, the vowel is long after a Mutable consonant when that consonant does not actually mutate, but short after a Mutable consonant when that consonant does in fact mutate.

The second type of exception to Mutation involves "positive" exceptions -- i.e. cases where the rule applies, even though the conditions for its application are not fulfilled. Exceptions of this type appear to be much

less frequent than simple negative exceptions, but the examples in (9) appear to be strong candidates for such a treatment:

- (9) bish-iɪ-e 'he hit'      cf.    ku-big-a 'to hit'  
       ta:z-iɪ-e 'he opened it wide' (alternatively: tag-i:ɪ-e) x-ta:g-a  
       laz-iɪ-e 'he went out'      ku-law-a  
       toz-eɪ-e 'he didn't find'    x-tow-a

The consonants g and w belong (regularly) to the class of Immutables and do not undergo Mutation before the perfect suffix. The roots -big-, -ta:g-, -law-, and -tow- are exceptions in that they do mutate: -big- changes its final consonant to sh, whereas the other three roots change their final consonant to z.

Once again, if it were correct that the length of -i(:)ɪ- is governed by the contrast Mutable vs. Immutable, then the vowel should be long in (9) just as it is long in (5). In both sets of cases the stem ends in an Immutable consonant. But the vowel is short in laz-iɪ-e, etc., not long as in duguw-i:ɪ-e, even though the roots -law- and -duguw- both end in w. In other words, the vowel of the perfect suffix is short after an Immutable consonant that does in fact mutate, but long after those Immutable consonants that (regularly) do not mutate.

The two classes of exceptions discussed above demonstrate that the structure of the stem prior to Mutation does not determine when the vowel of -i(:)ɪ- is short as opposed to when it is long. The contrast Mutable vs. Immutable is not, in fact, the relevant contrast. It would seem rather that the contrast Mutated vs. Unmutated is the crucial one. The vowel of the perfect suffix is long after an Unmutated consonant, but short after a Mutated consonant. The Unmutated consonants are those Immutable consonants that have (regularly) failed to undergo Mutation and also those Mutable consonants that have (exceptionally) failed to undergo Mutation. The Mutated consonants are those Mutable consonants that have (regularly) mutated, as well as those Immutable consonants that have (exceptionally) mutated.

Let us now consider how we can formulate the above observations into a rule. Assume for the moment that the vowel of the perfect suffix is basically long. We would then want to say: shorten this vowel when it is preceded by a Mutated consonant. How do we identify a "mutated" consonant?

We have already seen that this concept is not equatable with the concept underlying the term *Mutable*. It would seem rather that it is the structure that results from Mutation that determines the length of the vowel of the perfect suffix. However, if one examines just the output of the rule of Mutation, it is not possible to distinguish (phonetically) a Mutated consonant from an Unmutated consonant. The reason that it is not possible has already been pointed out: the consonants *s*, *z*, and *sh* may be either Mutated consonants (in the event that they derive from underlying stops or *ɬ*) or Unmutated (in the event that they derive from underlying *s*, *z*, or *sh*). The vowel of the perfect suffix is long in *kos-e:z-e* 'he made a mistake', but short in *pis-iɪ-e* 'he passed'; in both cases the stem ends phonetically in *s*, but in the former case the *s* is Unmutated (deriving from underlying *s*) while in the latter case it is Mutated (deriving from underlying *t*). Thus the post-Mutation structure cannot, by itself, provide sufficient information to distinguish Unmutated from Mutated consonants.

The reader may have noted that *kos-e:z-e* and *pis-iɪ-e* differ not just in the length of the vowel of the perfect suffix, but also in the quality of the consonant of that suffix: *z* in *kos-e:z-e*, but *ɬ* in *pis-iɪ-e*. Could that not have something to do with the length of the preceding vowel? Recall that this difference in the shape of the consonant of the perfect suffix is due to the fact that *ɬ-to-z* rule does not apply after a stem-final *s*, *z*, or *sh* resulting from Mutation. In *kos-e:z-e*, the verb stem ends underlyingly in *s*, and thus the *ɬ* of the perfect changes to *z* as required by the *ɬ-to-z* rule. In *pis-iɪ-e*, on the other hand, the stem ends in *t* underlyingly, and the *ɬ-to-z* rule does not affect the *ɬ* of the perfect suffix. Given our analysis, then, the fact that in *kos-e:z-e* the suffix has a long vowel followed by *z* whereas *pis-iɪ-e* has a short vowel followed by *ɬ* is simply the consequence of the fact that both the rule assigning the appropriate vowel length to *-i(:)ɬ-* and also the *ɬ-to-z* rule depend crucially on the contrast between Mutated and Unmutated consonants. There is good evidence in support of the contention that there is no direct connection between the length of the vowel and the change of *ɬ* to *z*. For one thing, there are many cases where a perfect suffix has *ɬ* preceded by a long vowel: e.g., *som-e:ɬ-e*, *jib-i:ɬ-e*, *had-i:ɬ-e*, etc. Such examples demonstrate that an *ɬ* in the perfect suffix does not generally require that



a short vowel precede. Secondly, there is evidence from exceptions again to support the claim that the appearance of  $\dot{\text{z}}$  vs.  $\text{z}$  in the perfect suffix is in no way directly correlated with the length of the preceding vowel. Recall that there are a few exceptions to the  $\dot{\text{z}}$ -to- $\text{z}$  rule:  $\text{bariz-i:}\dot{\text{z}}\text{-e}$ ,  $\text{jasus-i:}\dot{\text{z}}\text{-e}$ ,  $\text{asis-i:}\dot{\text{z}}\text{-e}$ . Notice that the fact that  $\dot{\text{z}}$  appears in these examples rather than  $\text{z}$  has no effect whatsoever on the length of the preceding vowel, which is long (just as it would be if the  $\dot{\text{z}}$  had undergone the  $\dot{\text{z}}$ -to- $\text{z}$  rule). The suffixal vowel is long in examples like  $\text{bariz-i:}\dot{\text{z}}\text{-e}$  simply because the preceding stem ends in an Unmutated consonant.

We have now shown that the structure that exists prior to Mutation cannot provide the relevant information to determine the length of  $-\text{i}(:)\dot{\text{z}}-$ , and that the structure that exists after Mutation cannot provide the necessary information either. Within the standard approach to generative phonology, only one move is left: put Mutation and the assignment of vowel length into one rule -- that is, formulate one transformational rule that simultaneously mutates a final consonant before the perfect suffix and also shortens the following vowel. Given such an analysis, if Mutation applies, then shortening of the following vowel will also occur; if Mutation does not apply, then neither will the shortening of the vowel of the perfect suffix. Thus the connection between a Mutated consonant and a following short vowel would be captured.

It should be noted that this transformational analysis requires that the vowel of  $-\text{i}(:)\dot{\text{z}}-$  be underlyingly long. If the vowel were bascially short, it would have to be lengthened after Unmutated consonants, but there is no way to link a change in vowel length to the lack of a change in the preceding consonant by means of a transformational rule. Transformational rules simply allow two structural changes to be welded together into one. The transformational anlaysis also requires that there be one Mutation rule to which the vowel length adjustment can be attached. Thus there must be one rule that (a) mutates voiceless stops after both vowels and nasals, (b) mutates voiced stops just when they are after nasals, and (c) mutates  $\dot{\text{z}}$ , but not  $\text{l}$  or  $\text{r}$ . Furthermore, that same rule must account for the "positive exceptions" in (9), such as  $\text{toz-e}\dot{\text{z}}\text{-e}$  from underlying  $/\text{tow-i:}\dot{\text{z}}\text{-e}/$ . If all of these changes in the final consonants of stems before the perfect suffix were not incorporated into one rule, it would be necessary to repeat

the length adjustment as part of each rule that would carry out the various mutations. Thus if the transformational analysis is the correct one, we have strong evidence that what we have been referring to as Mutation should be formalized as a single rule.

There is an alternative to the transformational analysis which would make use of a global rule. The principle would be simply: the vowel of the perfect suffix is short after a Mutated consonant (i.e., a consonant that has been derived by Mutation), and long otherwise. This formulation of the rule assumes that there is one rule of Mutation. If there are in fact two or more separate rules of Mutation, then we would have to revise our characterization of "Mutated" consonant to mean a consonant derived by means of any rule that alters a stem-final consonant preceding the perfect suffix. The global rule approach allows a rule to consider the derivational history of a given structure, and thus allows a Mutated consonant to be distinguished from an Unmutated consonant.

Recall that the *ɪ*-to-*z* rule likewise must distinguish between Mutated and Unmutated consonants (since the perfect suffix changes its *ɪ* to *z* after Unmutated *s*, *z*, *sh*, and *ŋ*). In that case it was possible to make this distinction by ordering the *ɪ*-to-*z* rule prior to Mutation. Global rules provided an alternative to this use of ordering. Now we see that the length of the vowel of the perfect suffix is also determined by a contrast between Mutated and Unmutated, but a rule ordering solution to this problem is not available. There is, we believe, a significant parallelism between the two cases: a phonetic feature in the perfect suffix (occurrence of *z* as opposed to *ɪ*, occurrence of a long as opposed to a short vowel) is being employed in such a way as to maintain a contrast that would otherwise be neutralized in the perfect stem. That is, the rule of Mutation neutralizes several phonological oppositions: *p*, *t*, and *s* are all realized as *s* before the perfect suffix; *k* and *sh* are both realized as *sh*; *ɪ* and *z* are both realized as *z*; and *mb*, *nd*, *ŋg*, and *nz* are all realized as *nz*. This neutralization, while very extensive, is partially offset by the fact that the perfect suffix will have a different phonological shape when a preceding *s*, *z*, or *sh* is derived via Mutation rather than being underlying. The interaction between the *ɪ*-to-*z* rule and Mutation helps to preserve underlying phonological contrasts, as does the interaction between the

assignment of length to -i(:)i- and Mutation. Given this parallelism between the two cases, we prefer to describe the interactions between i-to-z and Mutation and between length adjustment and Mutation in parallel fashion. Global rules allow a parallel description, rule ordering does not.

We have not shown that a global rule must be used rather than a transformational rule in accounting for the length of the vowel of the perfect suffix. Either approach is possible, since both allow one phonological change to be tied directly to another phonological change. The data in this paper seem to establish clearly that two phonological changes may in fact be inseparably linked so that one of the changes occurs only if the other also occurs. The proper description of such linkages is still uncertain, but the existence of a need for an appropriate descriptive device has been supported.

#### Footnotes

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<sup>1</sup> Chi-Mwi:ni is so described in the two published descriptions of the language available to us: Whiteley (1965) and Goodman (1967). Neither of these brief studies examines the problems that we will be focusing on in any detail; furthermore, Whiteley's transcription of vowel length is, in certain cases, at variance with ours. It should be pointed out, however, that Whiteley's work on the language was apparently of a very brief duration. It is also relevant to note that there are vowel lengthening and vowel shortening rules that operate over "phrases", and thus the shape that a word has in isolation may differ from its shape in a particular phrasal context. (Cf. Goodman (1967) and Kisseberth and Abasheikh (1974) for some discussion.) The forms of words cited in the present paper are "isolation" forms.

<sup>2</sup> A description of Chi-Mwi:ni phonetics will not be given here, but a few comments on the transcription employed are in order. t and d represent dental stops, as opposed to alveolar t and d. dh stands for a voiced retroflexed sound that has been borrowed from Somali and is limited (almost

universally) to Somali loanwords. (The new Somali orthography employs the symbol "dh" for the sound in question, and we are simply following this orthographic practice.) d is used for phonetic [ð], ch for [ç], and sh for [ʃ].

<sup>3</sup>The mutation of voiceless stops occurs regularly when that stop is preceded by a vowel, as shown by the examples in the text, and also when that stop is preceded by a nasal, as can be seen from examples like nu:nsh-i-i-e 'he smelled' (ku-nu:ŋk<sup>n</sup>-a), ku:ns-i-i-e 'he was in financial difficulty' (x-ku:nt<sup>n</sup>-a), pepe:ns-e-i-e 'he separated the husks from grain' (x-pepe:nt<sup>n</sup>-a). If a non-nasal consonant precedes, however, mutation does not occur. Thus: shart-i:i-e 'he imposed a condition' (x-shart-a), shirk-i:i-e 'he claimed divine qualities' (x-shirk-a), isk-i:i-e 'he shook s.t.' (k-isk-a).

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ON THE INTERACTION OF PHONOLOGY AND MORPHOLOGY: A CHI-MWI:NI EXAMPLE

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In the present note we discuss a problem in linguistic description located at the interface between morphology and morphophonemics. Some possible descriptions of the data are presented, and their relative merits briefly analyzed. The data appear to us to be sufficiently interesting to warrant examination, even though at the present time the proper description of the data remains open to question.

The focus of our concern is the passive verb in Chi-Mwi:ni, a Bantu language spoken in and around the city of Brava in Somalia.<sup>1</sup> In particular, we will be concerned with the shape that a perfective verbal stem assumes when it is passivized.<sup>2</sup> We shall refer to these verbal forms as passive perfects. Opposed to the passive perfects are, on the one hand, all other passive verbal forms (passive non-perfects), and on the other hand, all active perfect verbal forms (active perfects).

Passive non-perfects are in all cases marked overtly by the presence of a suffix -o:w-, this suffix being located immediately before the "final vowel" that obligatorily terminates verbs in Chi-Mwi:ni as in other Bantu languages.<sup>3</sup> Some examples of the -o:w- suffix:

- (1) ku-ium-o:w-a 'to be bitten' (-ium- 'bite')  
na-kimb-il-o:w-a 'she is being sung to' (-imb-il- 'sing', -imb-il- 'sing to')  
n-p-o:w-e 'that you pl. be given (it)' (-p- 'give')  
ha-'ambil-o:w-i 'he isn't told' (-ambil- 'tell')

The phonological problems posed by the suffixation of -o:w- in passive non-perfects are minimal. This morpheme participates regularly in one very general morphophonemic processes in the language: this process shortens all but the last long vowel in a word or phrase.<sup>4</sup> The -o:w- suffix will thus induce the shortening of any preceding long vowel and will itself shorten if it is followed by another long vowel. Examples:

- (2) ku-da:r-a 'to touch'      ku-dar-o:w-a 'to be touched'  
x-so:m-a 'to read'      x-som-o:w-a 'to be read'

x-fa:n-a 'to do'	x-fañ-o:w-a 'to be done'
x-pe:nd-a 'to like'	x-pend-o:w-a 'to be liked'
ta-x-tukul-ow-a:-yi? 'how will he be carried?' (-tukul- 'carry')	
ta-k-ambil-ow-a:-yi? 'how will he be told?' (-ambi- 'tell')	
na-k-udish ow-a: nt <sup>h</sup> o 'he is being annoyed very much?' (-udish- 'annoy')	
ta-x-p-ow-a chibu:ku 'he will be given a book' (-p- 'give')	

The passive suffix -o:w- conditions one other change: an immediately preceding  $\dot{\iota}$  is converted to l.<sup>5</sup> Since this change is of considerable relevance to the ensuing discussion, we document it rather fully here.

(3) Root  $\dot{\iota}$  changes to l immediately before -o:w-.

ku-ya:i-a 'to sow'	ku-yal-o:w-a 'to be sown'
ku-mo:i-a 'to shave'	ku-mol-o:w-a 'to be shaven'
x-pe:i-a 'to sweep'	x-pel-o:w-a 'to be swept'
ku-bo:i-a 'to steal'	ku-bol-o:w-a 'to be stolen'
k-i:ngil-a 'to enter'	k-ingil-o:w-a 'to be entered'
k-a:mbi-a 'to tell'	k-ambil-o:w-a 'to be told'

Suffixal  $\dot{\iota}$  changes to l immediately before -o:w-.

k-andik-i-a 'to write to'	k-andik-il-o:w-a 'to be written to'
---------------------------	-------------------------------------

k-i:mb-i-a 'to sing to'	k-imb-il-o:w-a 'to be sung to'
x-pik-i-a 'to cook for'	x-pik-il-o:w-a 'to be cooked for'
x-fu:ng-u-i-a 'to open'	x-fung-ul-o:w-a 'to be opened'
k-a:mb-u-i-a 'to peel off'	k-amb-ul-o:w-a 'to be peeled off'
x-tu:mb-u-i-a 'to pierce, perforate'	x-tumb-ul-o:w-a 'to be pierced, perforated'

It should be observed that it is only  $\dot{\iota}$  immediately before the -o:w- suffix that changes to l. Thus in ku-tum-o:w-a 'to be bitten', the root-initial  $\dot{\iota}$  is unaffected. Similarly, in ku-bar-sh-iiz-o:w-a 'to be trained for', the "applied" suffix -iiz-<sup>6</sup> is unaffected since its  $\dot{\iota}$  is not immediately followed by the -o:w- suffix.

We can now turn to a consideration of the one context where the construction of a passive verbal form is not quite so obvious: namely,

the case of passive perfects. The perfective construction is, in general, a rather complicated affair in Chi-Mwi:ni, and a full discussion is not possible here. (Cf. Kisseberth and Abasheikh (1974,b) for some discussion of major aspects of the problem.) For our present purposes, however, we need only note that there are two essential methods of forming a perfective stem: Suffixation and Ablaut. Suffixed perfectives involve the addition of a suffix whose basic form is -i:i- (this suffix has a number of surface alternants and also triggers a number of changes in preceding stem-final consonants). Ablaut perfectives involve a lengthening of the last vowel of the verb stem, with a change in vowel quality in some cases.

Let us consider Suffixed perfectives first. Below we give a number of examples of verb stems, showing first their active perfect shape and then their passive perfect shape.

- |                    |                          |                              |
|--------------------|--------------------------|------------------------------|
| (4) -mo:i- 'shave' | mo:z-ei-e 'he shaved'    | mo:z-el-a 'he was shaved'    |
| -ɿum- 'bite'       | ɿum-i:i-e 'he bit'       | ɿum-i:l-a 'he was bitten'    |
| -pe:nd- 'like'     | pe:nz-ei-e 'he liked'    | pe:nz-el-a 'he was liked'    |
| -big- 'hit'        | bish-iɿ-e 'he hit'       | bish-il-a 'he was hit'       |
| -barsh- 'train'    | barsh-i:z-e 'he trained' | barsh-i:z-a 'he was trained' |
| -bu:s- 'kiss'      | bus-i:z-e 'he kissed'    | bus-i:z-a 'he was kissed'    |

One essential aspect of the passive perfect is that the final vowel is -a, even though the final vowel of the active perfect is regularly -e.<sup>7</sup> Second, there is no overt occurrence of the passive suffix -o:w-. Third, the passive perfect stem is exactly identical to the active perfect stem, EXCEPT that if the active perfect stem ends in i that consonant is changed to l. Thus whereas the perfect stem of -barsh- 'train' is barsh-i:z- in both the active and the passive, the perfect stem of -ɿum- 'bite' is ɿum-iɿ- in the active but ɿum-il- in the passive.

Consider now the Ablaut perfectives, illustrated in (5) below:

- |                            |                         |                             |
|----------------------------|-------------------------|-----------------------------|
| (5) -won- 'see'            | we:n-e 'he saw'         | we:n-a 'he was seen'        |
| -pat- 'find, get'          | pe:t-e 'he found'       | pe:t-a 'he was found'       |
| -tai- 'take'               | te:t-e 'he took'        | te:t-a 'he was taken'       |
| -tafun- 'to chew'          | tafi:n-e 'he chewed'    | i-tafi:n-a 'it was chewed'  |
| -ɿekez- 'direct, instruct' | ɿekez-e 'he instructed' | ɿekez-a 'he was instructed' |

-fu:nguɪ- 'open'      fungi:ɪ-e 'he opened'      i-fungɪ:l-a 'it was opened'  
 -ambuɪ- 'peel off'      ambi:ɪe 'he peeled off'      i-ambi:ɪ-a 'it was peeled off'  
 -ɪe:ɪez- 'loosen'      ɪe:ɪe:z-e 'he loosened'      i-ɪe:ɪe:z-a 'it was loosened'

Once again we see the same pattern as with the Suffixed Perfectives: the final vowel of the passive perfect is -a, whereas it is -e for the active perfects; there is no overt occurrence of the passive suffix -o:w-, and if the active perfect stem ends in ɪ, that ɪ changes to l. It should be noted that in the case of passives of Suffixed Perfectives, such as ɪum-i:l-a, the ɪ that changes to l is part of the perfective suffix -i:ɪ-; in the case of passives of Ablaut Perfectives, such as i-fung-i:l-a, the ɪ that changes is part either of the verbal root or of a derivational affix.

Let us turn now to a consideration of how the above observations might be formulated in an explicit generative description. That the final vowel of passive perfects is -a whereas the final vowel of active perfects is -e must (apparently) be treated as simply an ad hoc morphological statement, parallel to a number of other such statements that must be made about the final vowel (e.g., although -e is normally the final vowel of an active perfect form, -o occurs instead if the verb is the main verb of a relative clause; on the other hand, the -a of passive perfects and the -i of negative habitual forms are retained even when the verb is the main verb of a relative clause). The absence of the -o:w- suffix in the passive perfect could be accounted for in two ways. First, one could say that the "spelling" rule for the passive is as in (6):

(6) PASSIVE  $\longrightarrow$   $\begin{cases} \text{o:w} & \text{in non-perfect verbal forms} \\ \emptyset & \text{in perfect verbal forms} \end{cases}$

In this view, a passive perfect never has associated with it the phonological material -o:w-. Alternatively, one could say that passive perfect verbs are assigned the phonological material -o:w- just like active perfects, but that there is a rule that deletes -o:w- just in case the verb is a perfective form. These two alternatives will be examined in further detail below when we take up the question of the change of ɪ to l. In the absence of a general theory of morphology, the choice between the above two descriptions is problematical.



The former analysis avoids claiming that the phonological material -o:w- is part of the derivation of a word such as  $\text{t}^{\text{h}}\text{um-i:l-a}$  at any point in its derivation. If one were to assume an underlying structure such as  $\text{t}^{\text{h}}\text{um-i:i:o:w-a}$ , then it would be necessary to delete the -o:w- suffix early enough in the derivation so that the long vowel in -o:w- would not induce a shortening of the preceding long vowel. In other words, it would be necessary to delete the -o:w- before its specific phonological shape could have an effect on neighboring elements. That this ordering of the rules would be required weakens the claim that -o:w- is part of the underlying structure of  $\text{t}^{\text{h}}\text{um-i:l-a}$  since in a case where this phonological material would produce a certain effect, it has to be deleted in order to avoid that effect. Since, however, the deletion of -o:w- is a morphological rule, one might argue that it is entirely natural that it should be applied before the essentially phonological rule that shortens all but the last long vowel in a phrase.

At this point we can turn our attention to what is the most tantalizing problem associated with the passive perfect construction: namely, the change of an  $\text{i}$  at the end of the perfect stem to  $\text{l}$ . This change is of particular interest because it would seem to be not unrelated to an observation made near the beginning of this paper: in passive non-perfects an  $\text{i}$  occurring immediately before the -o:w- suffix is changed to  $\text{l}$ . How is the change of  $\text{i}$  to  $\text{l}$  in passive perfects to be hooked up to the same change of  $\text{i}$  to  $\text{l}$  in passive non-perfects?

One analysis would go as follows. The language has a morphophonemic rule of the form given in (7):

$$(7) \text{ i} \longrightarrow \text{ l } / \text{ \_\_\_\_\_\_ } + \text{o:w}$$

In addition, the underlying structure of  $\text{t}^{\text{h}}\text{um-i:l-a}$  is  $/\text{t}^{\text{h}}\text{um-i:i:o:w-a}/$ , and the rule that deletes -o:w- is ordered to apply after (7). The derivation of  $\text{ku-mol-o:w-a}$  and  $\text{t}^{\text{h}}\text{um-i:l-a}$  would be in this analysis as in (8):

(8)	$\text{ku-mo:i-o:w-a}$	$\text{t}^{\text{h}}\text{um-i:i-o:w-a}$	
	$\text{ku-mo:l-o:w-a}$	$\text{t}^{\text{h}}\text{um-i:l-o:w-a}$	$\text{i to l}$
	inapplicable	$\text{t}^{\text{h}}\text{um-i:l-a}$	$\text{o:w- deletion}$

This description accounts for the data neatly. The change of  $\text{i}$  to  $\text{l}$  in  $\text{t}^{\text{h}}\text{um-i:l-a}$  is treated as being due to exactly the same principle as operates in  $\text{ku-mol-o:w-a}$ .

The above analysis is problematical on two accounts. One, it requires that -o:w- be in the underlying representation of passive perfects (see above for discussion of the merits of this position). Two, rule (7) is questionable. It is formulated so that the change of  $\dot{i}$  to  $l$  is induced by the phonological material -o:w-, but there is no evidence that the phonological shape of the passive suffix is relevant at all (synchronically<sup>8</sup>).

Rule (7) could just as well be formulated as in (9):

(9)  $\dot{i} \longrightarrow l$  / \_\_\_\_\_ + {PASSIVE}

(9) says simply that an  $\dot{i}$  immediately before the passive suffix is changed to  $l$ . The phonological shape of that suffix is irrelevant. If (9) were accepted, then the underlying structure of  $\dot{i}um-i:l-a$  could be  $/\dot{i}um-i:\dot{i}-$

$\emptyset$  -a/, whereas  $ku-mol-o:w-a$  would be  $/ku-mo:\dot{i}-o:w-a$  /. Rule (9)

PASS PASS

would apply to both representations to convert the  $\dot{i}$  immediately before the passive morpheme to  $l$ . This approach assumes that  $\dot{i}um-i:l-a$  never has associated with it the phonological material -o:w-; rather, it assumes that in the underlying structure a passive morpheme occurs, with  $\emptyset$  as its phonological shape, between the perfect stem and the final vowel. The occurrence of this morpheme in this position is absolutely crucial to the correct application of (9), since this rule is formulated so as to change  $\dot{i}$  to  $l$  just in case it immediately precedes the passive morpheme.

At this point one might ask: do we really need to say that there is a passive morpheme located between the perfect stem and the final vowel? Could we not alter rule (9) so that it reads as in (10):

(10)  $\dot{i} \longrightarrow l$  in a "passive" verbal form

In this sort of analysis,  $\dot{i}um-i:l-a$  would not contain a passive morpheme located in a particular linear order; rather, the fact that it is passive would be given either by a feature associated with the entire verbal form or by an examination of its syntactic derivation (depending upon one's preference for syntactic features or for global rules).

As stated, rule (10) will not work. (10) predicts that one will not find  $\dot{i}$  in a passive verbal form, which is incorrect: cf.  $\dot{i}um-i:l-a$ ,  $\dot{i}eke:z-a$ ,  $i-\dot{i}e\dot{i}e:z-a$ . (10) would have to be modified to affect an  $\dot{i}$  at just certain locations in passive verbal forms: namely, in passive



## Footnotes

<sup>1</sup>Previous to our own work, the only published descriptions of Chi-Mwi:ni were Whiteley (1965) and Goodman (1967). Whiteley's article is a brief, general description of the phonology and morphology, based on a very short period of contact with the language. Goodman's article is a more detailed account of vowel length and accent; much additional work, however, remains to be done on these topics. Our own work on the language is still in progress, but some preliminary results are provided in Kisseberth and Abasheikh (1974 a,b,c).

<sup>2</sup>For a detailed description of the construction of "suffixed" active perfect stems, see Kisseberth and Abasheikh (1974c).

<sup>3</sup>This vowel is -e in active perfect forms and (most) subjunctive forms, -i in negative habitual forms, -o in (many) relative verbal forms, and -a in all other cases.

<sup>4</sup>See Goodman (1965) and Kisseberth and Abasheikh (1974a) for a fairly detailed account of vowel length in Chi-Mwi:ni.

<sup>5</sup>Preliminary instrumental investigation suggests the following differences between ɬ and l: in the articulation of ɬ the tongue tip strikes lightly against a small area to the front of the alveolar ridge, without lateral contact, whereas in the articulation of l there is a wider area of contact, including lateral contact. The duration of l is considerably greater than that of ɬ.

<sup>6</sup>The applied suffix is regularly -iɬ- (-eɬ- by virtue of a vowel harmony process), but assumes the shape -iɬiz- (-eɬez-) in certain phonological environments. For a full description of the phonology of the applied stem, see Kisseberth and Abasheikh (1974b).

<sup>7</sup>The final vowel -e is not an invariable characteristic of active perfects, however. If an active perfect stem is functioning as the main verb of a relative clause, its final vowel will be -o rather than -e. Passive perfect stems, however, retain -a as their final vowel even when functioning as the main verb of a relative clause. Thus the contrast between active and passive forms like barsh-i:z-e/barsh-i:z-a is retained in relative forms as barsh-i:z-o/barsh-i:z-a.

<sup>8</sup>We are not certain of the diachronic explanation of the change of ɬ to l in passive forms. It should be pointed out that there is evidence that ɬ is converted to l in pre-consonantal position generally in the language. If the passive suffix was at some point -w- (as it is synchronically in many Bantu languages), rather than -o:w-, then the shift of ɬ to l might be a reflex of that pre-consonantal environment.

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OPACITY AND RULE LOSS

Margie O'Bryan

It has been proposed by Kiparsky (1971) that the principle of transparency/opacity has an important role to play in the grammars of languages. He suggests that the unmarked interaction of rules is that which leads to maximally transparent rules, while marked interactions lead to opaque rules. From this principle then, the predicted direction of linguistic change would be toward transparent rule interaction. In keeping with this, Kiparsky suggests that opacity will tend to be eliminated in the course of change through rule re-ordering, rule generalization or rule loss. This mechanism would, then, seem to provide us with a manner of predicting when some readjustment of the grammar will take place. In spite of this, however, there are numerous readily available examples of apparent opaque rules and rule interactions which exist in the grammars of languages, there being (in many cases) no apparent attempt made to ameliorate the situation by any of the above-mentioned means. Recently, Kisseberth has taken a step in the direction of predicting when opaque rule interactions will occur in languages. His proposal is that opaque interactions are the result of the basic polarity of language--that is, "the tension in language created by conflicting pressures which are exerted on it". Thus, opaque rule interactions (that is, opaque by Kiparsky's definition) serve to keep

semantically contrasting forms phonetically separate; to preserve morphological distinctions; or to preserve underlying phonological contrasts on the surface. Similarly, Kaye has recently made the independent discovery that opaque rule interactions are tolerated if the rules are recoverable. He was led to this conclusion by the fact that there exist many instances of rules which display very natural relationships--in fact, the kinds of relationships found in language after language; yet, these all involve opaque interactions of rules. He discovered on the other hand, however, that they also all have in common the fact that the rules are always recoverable. A typical example involving opacity and recoverability is the following:

French Nasalization: /fin/ → [fẽ]

where the nasalization is "opaque", but recoverable.

Thus, to summarize all of these, it seems to be the case that opaque rule interactions are tolerated by languages only if such interactions are motivated--that is, if the reason (or cause) is transparent, if the language gains something from the opacity, or if the rule is recoverable. Other cases of opaque rule interactions will be unstable and an adjustment will take place in the grammar to eliminate the opacity, explaining the fact that, as Kisseberth claims, these interactions rarely, if ever, are found to remain.

At this point in our research, then, we seem to have the beginnings of a workable means of being able to predict the



direction of change in terms of rule interactions.

In this paper, I wish to consider another possible way of predicting change, in particular, rule loss, also in terms of the concept of opacity. Specifically, what I wish to show is that we need to expand our concept of opacity to include another type, namely, what I will call derivational opacity. This type of opacity does not involve rule interaction (in the usual sense of the term, that is), but rather assumes the form of rule competition or ambiguity. Rather than being distinguished by some sort of contradiction of a rule on the surface, derivational opacity is distinguished by the impossibility of determining which of two derivations a form has undergone, or, in other cases, by the impossibility of determining without the help of diacritics, which of two derivations a form is to undergo although, as the examples will show, opacity of the usual sort may also accompany the derivational opacity.

By its very nature, derivational opacity should tend to not be tolerated by languages, for it is in general not motivated in the sense that Kisseberth found apparent opaque rule interactions to be, nor in the sense that Kaye found, for, also by its very nature, it does not involve recoverability of the rule or derivational process. This type of opacity should then be predictably subject to elimination by rule loss (or generalization, in certain cases), and such elimination, both phonological and morphological does in fact appear to be the usual course of action.

Before continuing, it should be emphasized that I have by no means carried out an exhaustive investigation of cases of rule loss, and I am thus simply offering suggestions which hopefully may be a positive step in the direction of shedding some light on the nature of the processes involved in the different sorts of linguistic change.

The principle of derivational opacity can be illustrated by the following examples. (The sources of these examples are given in the bibliography). The first two examples illustrate derivational ambiguity involving surface forms, and the other two show loss resulting from derivational competition.

The first example is taken from Semai, a Malayan language spoken by about 16,000 people, and involves the interaction of several morphological processes. For roots of the canonical shape  $C_3C_2VC_1$ , there are three infixation processes. The first infixes an r between the first two consonants to form causatives:

kʔa:ĉ 'be humid'; krʔa:ĉ 'to wet something'  
 sŋph 'be afraid'; srŋph 'to frighten someone'

The second infixes a nasal to form a noun of action. The nasal then assimilates to the following consonant:

ʃʔ:ɣ 'be numerous'; ʃnʔs:ɣ 'quantity'  
 sma:n̄ 'ask'; smma:n̄ 'a request'

The third is a variable infix denoting indeterminacy. This process infixes a copy of the final consonant between the first two consonants:

krəp 'be on the lookout; kprəp 'to chase'

êʔu:l 'swallow the wrong way'; êlʔu:l 'suffocate'

The existence of the last infixation process causes ambiguities to arise, for if the root-final consonant is r or a nasal, the infixed form will be identical in form to the causative and the noun of action respectively:

pde:r 'to say something'; prde:r 'to speak, cause to say'

êdo:n 'to lean on something'; êndo:n 'the act of leaning',  
or 'to lean' (in general)

It turns out to be the case that roots in final nasals present little problem, since the noun of action functions like all other nouns, while the indeterminate preserves the role of a verb, and the verb and the noun are quite distinct in Semai syntax. The causative, however, since it functions as a verb, has syntactic properties which are the same as those of the indeterminate, which is also a verb. Forms from roots in final r are thus opaque with respect to the morphological rule which infixes an r to form causatives and to that which copies the root-final consonant to form indeterminates. This opacity assumes the form of derivational (and morphological) ambiguity, for it is impossible to determine, from the surface forms, which morphological derivational process a form has undergone. This undesirable situation is in the process of being ameliorated through rule loss. In several Western dialects the indeterminate is now formed by infixing a glottal stop, thus eliminating the possibility of morphologically ambiguous formations:

Western dialects:	<u>old form</u>	<u>new form</u>	
	tsgɔs	tʔgɔs	'to be hard' (indeterminate)
	srlɔ:r	sʔlɔ:r	'to pile up' (indeterminate)

The second example is taken from Early Middle Indic (represented here by Pāli) and involves interactions between certain phonological and morphological processes. In Early Middle Indic, the morphological process commonly referred to as full-grade formation was accomplished by the addition of the vowel a to the underlying root vowels i, u, and a, as follows:

/i/ → (full-grade) /ai/ → (by contraction) e. /pis-/ → pes-  
 /u/ → (full-grade) /au/ → (by contraction) o. /phus-/ → phos-  
 /a/ → (full-grade) /aa/ → (by contraction) ā. /vah-/ → vāh-

Although there is good evidence that the above full-grade formation process was operative in pre-Pāli and to some degree in historical Pāli, it is nevertheless the case that in most categories characterized by full-grade root formation we find a newer type of formation having taken over nearly completely. This newer type of formation consists of the underlying root with an epenthetic vowel i between the root and the suffix, as shown in the following examples:

chind-i-ssa-, future of chind-; bhuñj-i-tum, infinitive of bhuñj-. The degree of extension of this newer process in the verbal categories of Pāli is quite asymmetrical, for, it is only in the full-grade categories that it has undergone such a large extension. In categories characterized by other ablaut grades, many inherited formations remain, the new process having spread

only to a limited degree. A look at verbal forms with the root vocalism a reveals a possible reason for the above-mentioned asymmetry. As the following examples show, the majority of forms with a do not show the full-grade long ā, but short a:

a. Majority type

hattar- < /har-tar-/  
 kattum < /kar-tum/  
 mantar- < /maññ-tar-/  
 vattar- < /vatt-tar-/  
 vatthum < /vas-tum/

b. Minority type

kātum < /kar-tum/  
 hātum < /har-tum/

The occurrence of forms with short a is due to two constraints in the language. One of these constraints prohibits long vowels in closed syllables. When a long vowel occurs in a closed syllable, there are two possible ways of resolving the problem--either the vowel must be shortened or the following consonant cluster must be simplified. There is, however, a constraint on consonant cluster simplification to the effect that two consonants separated by a morpheme boundary may not undergo further simplification. Thus, a form such as /hār-tar-/  
 (→ hāt-tar-) must be simplified, and since the majority of forms have the shape shown in column (a) above rather than that in column (b), we can assume that the phonological constraint on consonant simplification takes precedence over the preservation of the long ā, which is the marker of the category. Although the reasons for the precedence of the constraint on

consonant simplification over the full-grade process are clear, a discussion of them is far beyond the limits of this paper. The forms with short a are thus opaque with respect to the morphological rule of full-grade formation. We might thus assume that the (incipient) loss of the morphological full-grade formation rule was due to this opacity. Consideration of certain other facts of the language reveals, however, that there is a much more serious degree of opacity involved than that just noted. The facts indicate that, for reasons which are, again, beyond the scope of this paper, some verbal formations consist simply of the underlying root--that is, no ablaut process having applied to it--and the suffix--that is, without the epenthetic vowel i:

ettum < /es-tum/ infinitive

pittha < /pis-ta/ participle

kattha < /kas-ta/ participle

dissa- < /dis-ssa-/ future

missa- < /min-ssa-/ future

In light of the existence of such forms, it is impossible to determine which derivational process forms with short a have undergone--that is, there is ambiguity as to whether these forms have undergone lengthening and subsequent shortening or whether they are derived from the underlying root. Thus, the vowel shortening which takes place in full-grade formations not only produces surface opacity, in that the full-grade formation rule is contradicted on the surface, but it also creates

opacity with respect to the derivational process which the forms have undergone.

It is interesting to note that the situation just described is in accord with the findings of Kisseberth and Kaye, described in the introduction, which indicate that opacity seems to be tolerated by languages if it is motivated or if the reason for the opacity is transparent. Thus, we might not expect the full-grade formation rule to have been lost simply as a result of the opacity created by shortening of the root vowel a, for the shortening is clearly motivated by the phonological constraint on consonant simplification. And, although it is of course impossible to know whether or not the rule would have been lost had only this latter situation obtained, we do have evidence that more factors were involved.

The third example is from Avestan, the oldest attested Iranian language and involves two assimilation rules. One rule, which is Iranian, is commonly referred to as Bartholomae's Law and changes voiceless stops to voiced aspirated stops following voiced aspirates: \*/drugh-ta/ → \*drug-dha (with de-aspiration of the first voiced aspirate). Voiced unaspirated stops, however, underwent regressive assimilation: \*/bhag-ta/ → \*bhaxta (with spirantization of the first voiceless stop). At a later stage, the voiced aspirated stops were de-aspirated, and the situation at this stage is thus one in which some voiced stops undergo regressive assimilation (that is, those which had original simple voiced stops) while others cause

progressive voicing assimilation (that is, those which, at this stage, have underlying representations like /drug-ta/ : ( → drugda) < \*/drugh-ta/). Both of these rules are found to be operative in the earliest attested stages of Avestan. In the later stages, however, the rule of progressive assimilation appears to have been lost and forms like /drug-ta/ < (\*/drugh-ta/) now undergo the progressive assimilation rule: /drug-ta/ → druxta (just like /bag-ta/ → baxta).

Thus, the loss of Bartholomae's Law (through the loss of voiced aspirates) rendered both the progressive assimilation rule and the rule of regressive assimilation opaque in a sense, for there then existed two minor rules--that is, two competing derivations of voicing assimilation for forms with identical underlying representations, necessitating in essence that every form be marked for which of the two rules it has to undergo. Thus, although neither of these rules is opaque by Kiparsky's original definition, since neither is actually contradicted on the surface, each rule can be considered opaque with respect to the other, since they perform different operations on identical underlying structures. Loss of one of these rules eliminated the derivational ambiguity (or competition) by making it possible for all forms with identical underlying representations to undergo the same rule.

The last example is representative of a particular (and common) type of derivational opacity. This type arises when originally distinct segments merge into one, with phonological



rules which affected one of the segments not affecting the other after the merger occurs. This type can be illustrated with an example from the Algonquian languages. The sequence of rules is as follows:

a.  $*\theta \rightarrow *\hat{s}/\_\_\_\_\_\_ *i$

b.  $*\theta \rightarrow *i$

c.  $i \rightarrow \hat{s}/\_\_\_\_\_\_ i$  (original i's are exceptions)

d.  
     (a)  $i \rightarrow \hat{s}/\_\_\_\_\_\_ i$  (generalized to all i's (in most languages))  
     (b) Entire palatalization rule is lost (in Delaware)

As the above rules indicate, Proto-Algonquian  $*\theta$  palatalized to  $*\hat{s}$  before  $*i$ .  $*\theta$  subsequently became  $*i$ , thus merging with original  $*i$ . Original  $*i$ , however, was not palatalized to  $\hat{s}$  by a following i. Thus, after the merger of  $*\theta$  and  $*i$ , there was a rule which palatalized i to  $\hat{s}$  before i and numerous exceptions to the rule. The exceptions were eliminated in two ways. In most Algonquian languages, the palatalization rule was generalized to all i's. In Delaware, however the palatalization rule was entirely lost. These exceptions to the palatalization rule of course had rendered the rule opaque. In addition, however, the manner in which this type of opacity arises causes a sort of derivational opacity to arise also, for, in such cases, the exceptions are necessarily so numerous that derivational competition exists (in this case) between palatalization of i and no change of i before i.

Although exceptions always cause a rule to be opaque in

the strict sense of the term, the normal case is that in which a rule applies to the vast majority of forms with only a few forms being exceptional. In such cases, the degree of opacity is slight and there is no actual derivational competition; and rules of this sort, along with their exceptions seem to survive for long periods of time.

Finally, it should be noted that in situations of the type just described, either rule loss or generalization can resolve the problem.

In conclusion, it should be added that derivational opacity, although its existence appears not to be motivated, as is the case with opaque rule interaction, seems to nevertheless not be subject to elimination to the extent that we find opaque rule interaction eliminated. This would seem to me to be due to the fact that there are many degrees of derivational opacity, making it of course difficult to draw a line for predicting when the opacity is great enough to actually cause a derivational ambiguity (or competition). Hopefully, however, we will be able to find enough cases such as those which I have just described to make it possible to make use of the notion of derivational opacity for predicting (at least some) types of linguistic change.

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SPEECH CHAIN AS AN ANALYSIS-BY-SYNTHESIS MODEL: A REVIEW

Farid H. Onn

0.0. Introduction

There are two aspects of ordinary speech communication: a linguistic message is encoded into articulatory gesture by a speaker, and acoustical signals are interpreted as a linguistic message by a hearer. Different messages are encoded as different gestures, and different signals are interpreted as different messages. Exactly how articulatory gestures are related to acoustical (let alone neurophysiological) signals, and what actually happens in the speech mechanisms during the production of speech events, have been some of the primary concerns of speech scientists for many years.

The notion that there is a variation of the gesture or the signal in accordance with the linguistic code of a particular language is based on the fact that there is no one-to-one relation<sup>1</sup> between code and gesture, signal and message, or between segments of an utterance and the phonemes. It is also because of this lack of a one-to-one correspondence between segments and phonemes that many phoneticians have expressed the view that speech analysis procedure which postulates that the hearer first segments the utterance and then identifies the individual segments with particular phonemes, can not successfully be implemented.<sup>2</sup> One could foresee this failure in the light of the complexity in which perceived language is related to the acoustical signal which conveys it; also, the changing configurations of man's vocal-tract, which are specified in terms of phonetic parameters, have been observed to be the result of instructions not from a single phoneme but from a given sequence of phonemes. However, to establish and study this complex relation between perceived language and the acoustical signal is by no means a hopeless undertaking. In fact, another speech analysis procedure has been proposed, a model that has been described as having the power to transform the continuously-changing speech signal into a discrete output without relying

crucially on segmentation. This model which analyzes the internally generated speech patterns through active internal synthesis of comparison of signals, has been called analysis-by-synthesis.

This brief paper attempts to characterize speech chain in terms of the proposed analysis-by-synthesis model, and to examine some of the empirical descriptive problems that a speech processing model, such as this, will encounter.

#### 1.0. Traditional view

Traditionally, a model of speech production is understood in terms of the view that the direct input of the speech production system consists of a series of phoneme commands. In expressing such a view, Halle (1962) writes:

It is assumed that stored in the memory of the speaker there is a table of all the phonemes and their different actualizations. This table is basically a dictionary in which can be found the different vocal-tract configurations or gestures that are associated with each phoneme, and the conditions under which each of the configurations or gestures is to be used. Associated with some phonemes there may be but a single configuration or gesture; with others the number of gestures may be large...In producing an utterance the speaker looks up in the table each phoneme in the utterance and then causes his vocal-tract to assume in succession the configurations or gestures corresponding to the phonemes composing the utterance. The vocal-tract behavior in turn causes disturbances in the air which are transmitted to our ears as acoustical signals (p. 429).

In short, the traditional view of the process of speech production assumes that there is in the speaker a set of instructions /rules which permit him to transform a sequence of discrete entities of phonemes into quasi-continuous behavior of the vocal-tract and later into a quasi-continuous acoustical signal. However, a speech production model which postulates that the hearer first segments the utterance and then identifies the segments as particular phonemes requires that he possesses in his memory

a list of the acoustical equivalents of the phonemes and that he must also be able to segment all utterances. But in principle, as Halle has observed, given the acoustic input, it is not possible for a hearer to segment all utterances. Analysis-by-synthesis, as a speech processing model, has been claimed to be a more effective model which could, among other things, overcome the problems which result from the seemingly impossible task of achieving complete segmentation of all utterances.

## 2.0. Analysis-by-synthesis model

Analysis-by-synthesis involves a process of specifying an unknown sign in terms of a best match selection from a standard inventory. More specifically, the model postulates that the process of speech chain involves the internal synthesis of patterns according to certain rules and a matching of these patterns which are internally generated against the pattern under analysis.

The block diagrams shown in figures I and II illustrate the basic operations involved in the speech analysis procedure to be described. The diagrams are essentially those of Stevens (1960) and Halle and Stevens (1964), except that they have slightly been simplified. The operation of stage I and stage II completes the proposed model of speech chain.

In figure I, the input speech signal first undergoes a "preliminary analysis" which constitutes various transformations, such as segmentation, identification of segments by special attributes, etc. Following this "preliminary analysis", the signal is then sent to the "comparator", where it is compared with the stored signals. The "comparator" also establishes a measure of the error between the stored articulatory descriptions and those generated by the model. Any such error is readily channeled through the "control" element which, after a number of trials, generates an output that identifies the acoustical signal. The "rules"<sup>3</sup> which may be regarded as the core of the speech process model transforms phoneme sequences to phonetic parameters. These rules also operate on the input signal to yield instructions to the vocal mechanism, and these instructions cause appropriate activity in the articulatory mechanism to generate the output sound

## STAGE 1:

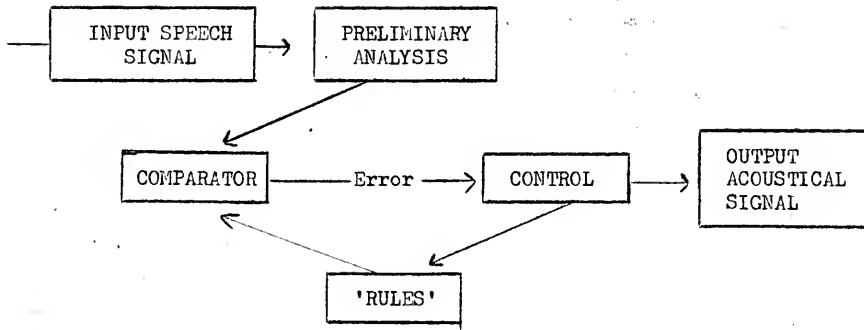


Fig. 1. Model of Speech Production

## STAGE 11:

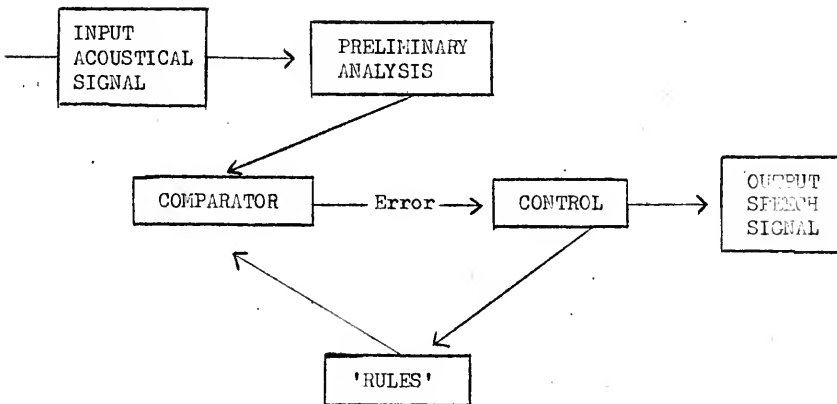


Fig. 11. Model of Speech Perception



which later becomes the input acoustical signal.

The operations carried out in the second stage of the speech process, as shown in Fig. II, are a repetition of those in the first stage, except that in the second stage, the input is an acoustical signal. Like the rules operating in the first stage, those in the second stage also constitute the heart of the perception model. In fact, following Halle (1962), the dual processes of production and perception ought to be viewed as separate utilization of a common core of rules rather than as distinct processes each with its own body of rules.<sup>4</sup> The two separate stages of the speech analysis model may be combined to form a truly single process of speech chain, as shown in Fig. III. In such a model, the group of components performing the functions of "preliminary analysis", "comparison" and "control" in a single block, has been labeled the "strategy".<sup>5</sup>

It must be emphasized that it is the employment of the rules, which are recursive, in the model that makes analysis-by-synthesis more effective and powerful than other previously constructed speech analysis procedures which compile speech generally from a dictionary of recordings or a look-up table of values. Obviously the operation of the rules of systematic synthesis is much more complex than a table of look-up procedure. As Kim (1966) describes it, "this set of rules may be regarded as a computer program instructing the synthesizer what parameters to operate, to what degree, for how long, etc., when given phonetic categories." (p. 63). The importance of "rules of synthesis" has also been greatly emphasized by Stevens (1960) who says that "rules for generating spectral patterns rather than the entire catalog of patterns themselves are stored, with a resulting large saving in storage capacity. Furthermore, if a proper strategy is devised for selecting the order in which patterns are synthesized for comparison with the input, then the number of patterns which must be generated and compared may be of orders of magnitude less than the total number of patterns that could be generated by the rules." (p. 53). What this amounts to is that not only the rules here are important but the order in which patterns are synthesized is also crucial, for without such order, the idea of analysis-by-synthesis

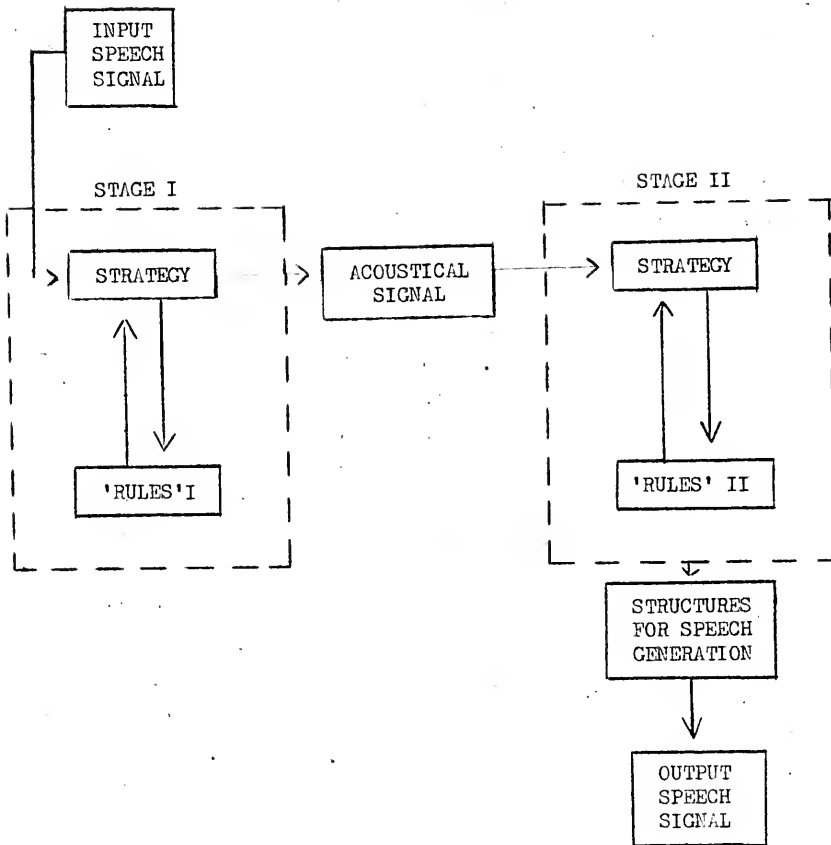


Fig. III Speech Chain as Analysis-by-Synthesis Model

becomes merely a process of trial and error. In proposing the kind of strategy for selecting the order, Stevens (1960) says, "the order in which different articulatory descriptions are tried may depend in part on data from a preliminary analysis of the signal, in part on data from previous spectra, and part on the results of previous trials on the spectrum under analysis." (p. 50).

### 3.0. Problems of selection

We have attempted to show that the generative mechanism operating in an analysis-by-synthesis speech model, which may need a digital computer of reasonable size and speed to stimulate all the operations, is more effective than a model which stores the pre-recorded fixed values in a look-up table, and drawing these values from the table by a simple substitution procedure. However, despite the complexity of the analysis-by-synthesis model, and its important advantages over other speech analysis procedures, the model is still a long way from being a complete machine capable of describing the whole of human speech behavior. There are still unsolved problems, mainly those that arise from our lack of knowledge in some areas of the speech behavior. For example, there is the problem of selection of the detailed form of representation of the articulatory description, especially at the neurophysiological level. Also, there is the requirement that in order for the generative rule components in the model to produce their maximum functions, they must have a complete set of rules capable of generating, for example, an articulatory description from a sequence of phonetic symbols; and also rules that describe the conversion of phonetic parameters to time-varying speech spectra. The following series of relations involving such generative rules have been noted: those between (1) the phonetic parameters and the vocal-tract geometry and excitation characteristics, (2) the transformation from vocal-tract geometry to the transfer function in terms of poles and zeros, and (3) the conversion from the pole-zero configurations and pertinent excitation characteristics to the speech spectra.

The problems that may be associated with the second set of rules are not without complexity. There is, for example, the problem of the utilization

of those phonetic parameters that are not governed by the language in question which must be described by the rules. The rules must also be able to specify the transformation from phoneme level representation having a discrete characteristic to continuous signals resulting from the inertia of the neural and muscular structures involved in speech production. In their discussion on the model and the notion of distinctive features, Stevens and Halle (1967) made particular reference to the question of the difficulty to isolate the segments and features in the actual speech event. They believe, however, that this difficulty could be resolved by recognizing explicitly that "...characterizations of speech in terms of segments and features are not more or less naturalistic records of particular physical events but are rather abstract representations of classes of events." (p. 90). In other words, it may be argued that an abstract representation of the speech event and a set of appropriate generative rules are involved in the process of speech production, and that those segments and features of the abstract representation may be regarded as instructions for particular types of behavior of the speech-generating mechanism. When these instructions are carried out, the various reactions occurring between different physiological structures will yield a quasi-continuous gesture in which the discrete instructions initiating the gesture are no longer always observable as distinct components. Finally, the execution of these instructions produces the acoustical signal.

It is therefore evident that the speech-generating mechanism can also be explained with reference to the nature of the abstract framework of segments and features, the entities which underlie the whole phonology of every human language. I believe it is also this portion of generative phonology, i.e., analysis of segments and features, that the first rule component in the analysis-by-synthesis model is to be mainly associated with. In particular, it is the conversion of the abstract representation of segments and features into a sequence of phonetic symbols that constitutes the major function of the first rule component in the speech analysis model, whereas the conversion of these phonetic symbols into phoneme level representation and later into words and sentences, in that order, is mainly the function of the second rule

component. In short, the first set of rules deals with the lower level of speech description, while the second set involves the higher level of analysis.

#### 4.0. Hierarchy and well-formedness

Perhaps, it is pertinent at this point to touch upon the question of "hierarchy" and "well-formedness". It has often been asserted that language is composed of segments and that these segments are arranged in hierarchically ordered layers.<sup>7</sup> Also it is a well known fact that every language possesses some specific constraints on the sequence of segments that can constitute a well-formed utterance. Language structure is said to be hierarchically ordered if we look at it as constituting two grammars: the phonology which contains segments that are themselves empty of meaning; and the other comprising morphology and syntax, which ascribes meaning and structural well-formedness to phonological segments. The proposed analysis-by-synthesis speech model can be said to have been developed to meet the presence of such linguistic phenomena. Thus, the notion of hierarchial order in language structure, for example, has necessitated the development of two rule-components in the proposed speech analysis model. So that, while the rules in the first component can take care of the lower order of phonological representation, the rules in the second component will, among other things, specify those constraints on the sequence of segments that constitutes well-formedness.

#### 5.0. Conclusion

In the preceding paragraphs, we have attempted to characterize speech chain in terms of the proposed analysis-by-synthesis model. Some of the empirical descriptive problems involving such a speech processing model have been examined. The problems are mainly those which involve or are associated with the rules that operate in the model. The model, however, is considered to have important advantages over other speech processing techniques. It has also been suggested that a model of the type reviewed here has applications in the analysis of linguistic phenomena at various levels of representation: acoustic, phonological, morphological, and syntactic.

## FOOTNOTES

<sup>1</sup>For discussion of some of the evidence, see P. Ladefoged's contribution to the Teddington Symposium, The Mechanization of Thought Processes, National Physical Laboratories, Symposium #10 (London 1959). C.G.M. Fant (1962) has also observed that the concept of speech is not as a sequence of discrete units with distinct boundaries, but rather as a continuous succession of gradually varying and overlapping patterns. He says, "the number of successive sound segments within an utterance is greater than the number of phonemes...Sound segment boundaries should not be confused with phoneme boundaries. Several adjacent sounds of connected speech may carry information on one and the same phoneme, and there is overlapping in so far as one and the same sound segment carries information on several adjacent phonemes." (p. 9).

<sup>2</sup>In his discussion on the acoustic aspects of speech, C.G.M. Fant (1962) commented on the failure of such speech analysis procedure, with the following words: "Phoneme recognizing machines of a simpler analog type have been constructed but their performance has not been very advanced. The possible vocabulary or phoneme inventory has been restricted, and the machines have not responded very well to any one else than "his master's voice"." (p.3).

<sup>3</sup>In Halle (1962), and Halle and Stevens (1964), these "rules" are referred to as "generative rules". But Stevens in his earlier paper (1960), refers to them as simply the "rules". Similarly, Liberman et al. (1959) made reference to "rules of synthesis" by saying: "The place rule for /l/ specifies locus frequencies at 360, 1260, and 2880 cps. . . the place rule for /æ/ fixes formant frequencies at 750, 1650, and 2460 cps.... (p. 1497).

<sup>4</sup>See M. Halle (1962), p. 433

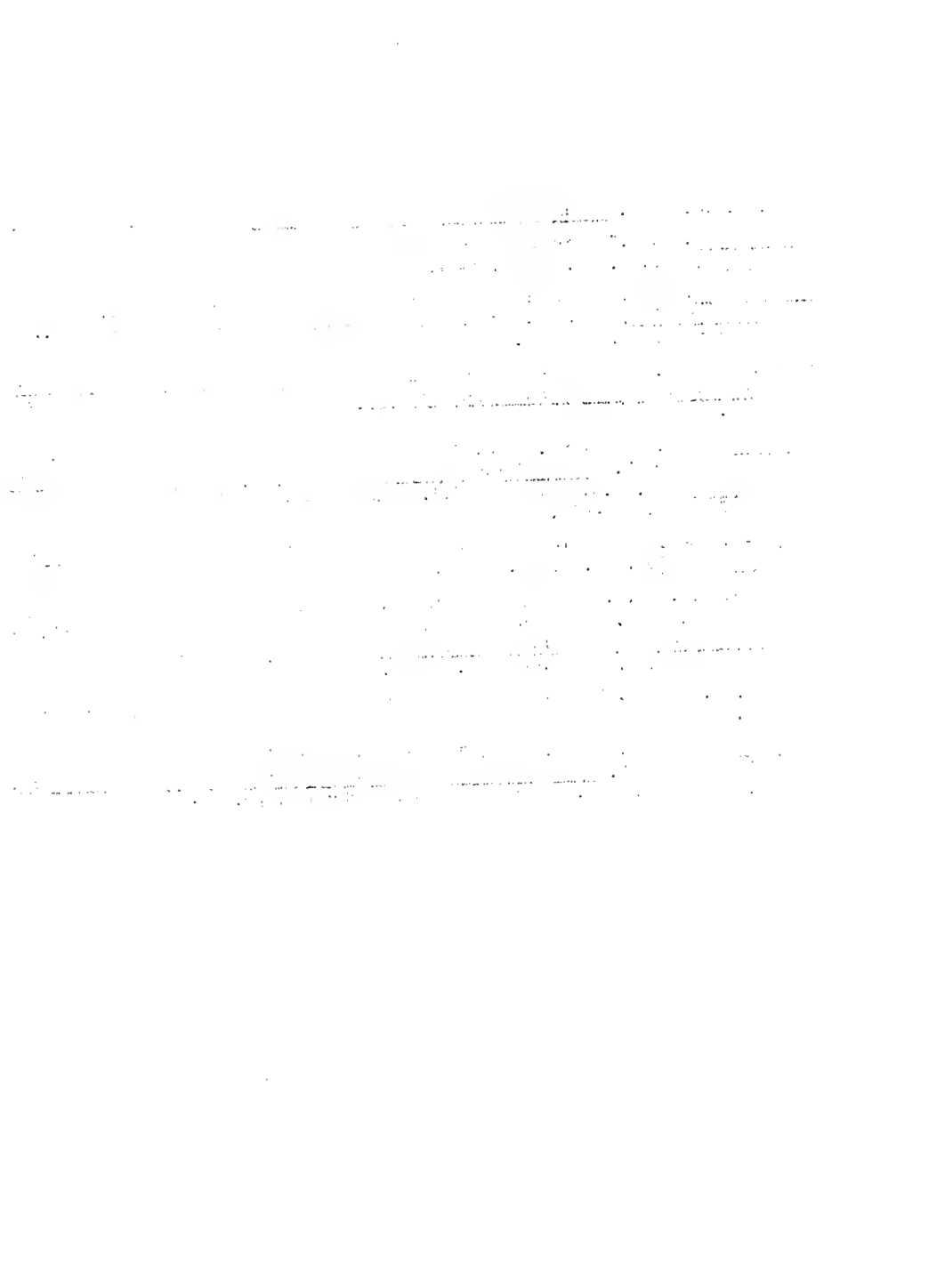
<sup>5</sup>See M. Halle and K.N. Stevens (1964) p. 610.

<sup>6</sup>Ibid., p. 611.

<sup>7</sup>This view has been expressed by linguists like Liberman, Cooper, MacNeilage, and Kennedy (though one might add that not all linguists will buy the hierarchical part of their assertion). See Liberman et al. (1967) p. 69.

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PHONETIC RESEARCH AT THE UNIVERSITY OF ILLINOIS

Han Sohn and C-W. Kim

Since a modest Phonetics Laboratory was installed in the fall of 1969, students taking the phonetics classes in the Department of Linguistics have been given the option of writing either a review-type term paper or an experimental paper. The experimental papers, together with the original data, have been filed and stored in the laboratory primarily for internal reference and as guides for further study. Listed below are these experimental papers written during the past five years. (The actual period covered is three years and a half. The use of the laboratory was lost for the fall semester of 1971, when the lab had to be dismantled and moved from its temporary location to the present permanent location, and for the academic year 1972-73 when Professor Kim took a leave of absence.) The list includes papers written by students in the beginning, as well as the advanced, phonetics classes. Consequently, the papers vary somewhat widely in their merits. Some are quite elementary, but two have found their way into journals, and a few more appear in the present issue of SLS.

In the following list, dates of the papers are given in parentheses, and the data used for each paper, mostly in the form of tapes, spectrograms, mingograms, and some palatograms, are given in square brackets. The list, alphabetized by authors' names, is followed by an index of subjects and an index of languages. The numbers in these indices refer to the papers in the first list.

It is hoped that this small collection will eventually grow into an

archive of working papers and data that will prove to be useful not only to departmental students and faculty but also to other researchers in phonetics and phonology.

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1. Amerman, James D.: An acoustical search for nasality characteristics existing in vowels embedded in various word-end phrase contexts: A preliminary study. (1970)  
[Spectrograms]
2. Awoyale, Yiwola: A re-examination of Yoruba vowels. (1972)  
[Tapes, spectrograms]
3. Barnitz, John B.: Chom-p-sky, Bloom-p-field, and phonetic enpen-t-thesis. (1973)  
[Tapes, spectrograms]
4. Beng, Joseph: Vowel harmony in Akan. (1971)  
[Tapes, spectrograms]
5. Bereiter, Marilyn: A study of  $\acute{V}$  t V.  
[Tapes]
6. \_\_\_\_\_: A study of duration in speech production. (1974)  
[Mingograms]
7. Bhatia, Taj: Hindi stops: An experimental study. (1971)  
[Mingograms, tapes]
8. \_\_\_\_\_: A study of aspirated consonants as spoken and recognized by Hindi speakers. (1973)  
[Tapes, spectrograms]
9. Chantorn, Charuvan: Stress in Thai. (1973)
10. Colberg, Thomas: Some findings on tonal interaction in Yoruba. (1971)

11. Daugherty, John: "aI Estēdi iŋlītš for faI dʒīrs". (1973)
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13. Dunlop, Wayne: An experiment in internal open juncture in American English. (1972)  
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[Tapes, spectrograms]
15. Gammon, Ann: The role of auditory feedback in the monitoring of stress and juncture differences in American English. (1970)
16. Greenberg, Roberta: The nature of stop consonant following an initial s. (1972)  
[Tapes, spectrograms]
17. Habick, Timothy: A description of the phonetic capabilities of a two year old child with special consideration of consonant clusters. (1972)  
[Tapes]
18. Houston, Jr., John: Syllable structure and stress placement. (1972)  
[Tapes]
19. Johnson, David: Acoustic characteristics of long and short vowels. (1972)  
[Tapes, spectrograms, mingograms]
20. Kahane, Charles: Relics of the underlayer in the pronunciation of American English by a native speaker of Greek. (1969)  
[Tapes]
21. Koermandy, Adrienne: On the reality of the phoneme. (1972)
22. Kuo, Wu-Yu: A comparison of Cantonese and Mandarin tones. (1970)  
[Tapes]

23. Lee, Sang Oak: English Pronunciation problems of Korean. (1973)
24. Linder, Sharon: Intonation and emotion. (1972)  
[Tapes]
25. Mahmoud, Samir M.: Emphatic consonants in Cairo Arabic. (1972)  
[Tapes]
26. Nakano, Keiko: Japanese diphthongs?. (1970)  
[Tapes, spectrograms]
27. Paik, Keumju: Vowel length in Korean. (1972)  
[Tapes]
28. Ryder, Thomas and Sandra Chappe: English as a rhythm-stressed language. (1973)
29. Schwarte, Barbara: Devoicing of final voiced stops in Black Dialect. (1972)  
[Tapes, spectrograms]
30. Shih, Katherine I-Ping: Aspiration in relation to tones in Chinese. (1971)
31. Smith, Chihae: On morea of consonants in Japanese. (1971)  
[Tapes, mingograms]
32. Skousen, Royal: Vowel and consonant length in Finish. (1970)  
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33. Sohn, Han: The pronunciation of Korean diphthong /ɨy/. (1972)  
[Tapes spectrograms]
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40. White, Gregory: Vowel length in minimal pairs. (1972)

[ Tapes, spectrograms ]

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Tapes, spectrograms

42. Woywod, Ferdinand: On the description of the three Polish sounds [s], [ʃ] and [ś]. (1971)

Tapes, palatograms, spectrograms

### Index of subjects

Aspiration: 8, 30

Auditory feedback: 15

Child language: 17

Consonants: 23, 25, 31, 35, 36, 42 (See also Stops)

Contrastive analysis: 11, 20, 37

Diphthongs: 12, 26, 33

Duration (length): 6, 19, 27, 32, 40

Epenthesis: 3

Glides: 41

Intonation: 24

Juncture: 13, 15

Nasality: 1

Phoneme: 21

Stops: 5, 7, 16, 29

Stress: 9, 15, 18, 28

Syllable: 18, 38

Tones: 10, 22, 30, 38

Vowels: 2, 14, 19, 27, 34, 37, 39, 40

Vowel harmony: 4

### Index of languages

Akan: 4

Arabic (Cairo): 25

Chinese: 22, 30

English, American: 1, 3, 5, 6, 13, 16, 20, 23, 28, 34, 40, 41

Other dialects: 11, 12, 14, 28

Finnish: 32

French: 39

Hebrew: 35

Hindi: 7, 8

Japanese: 26, 31

Korean: 27, 33

Polish: 42

Spanish: 36

Thai: 9, 38

Yoruba: 2, 19













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